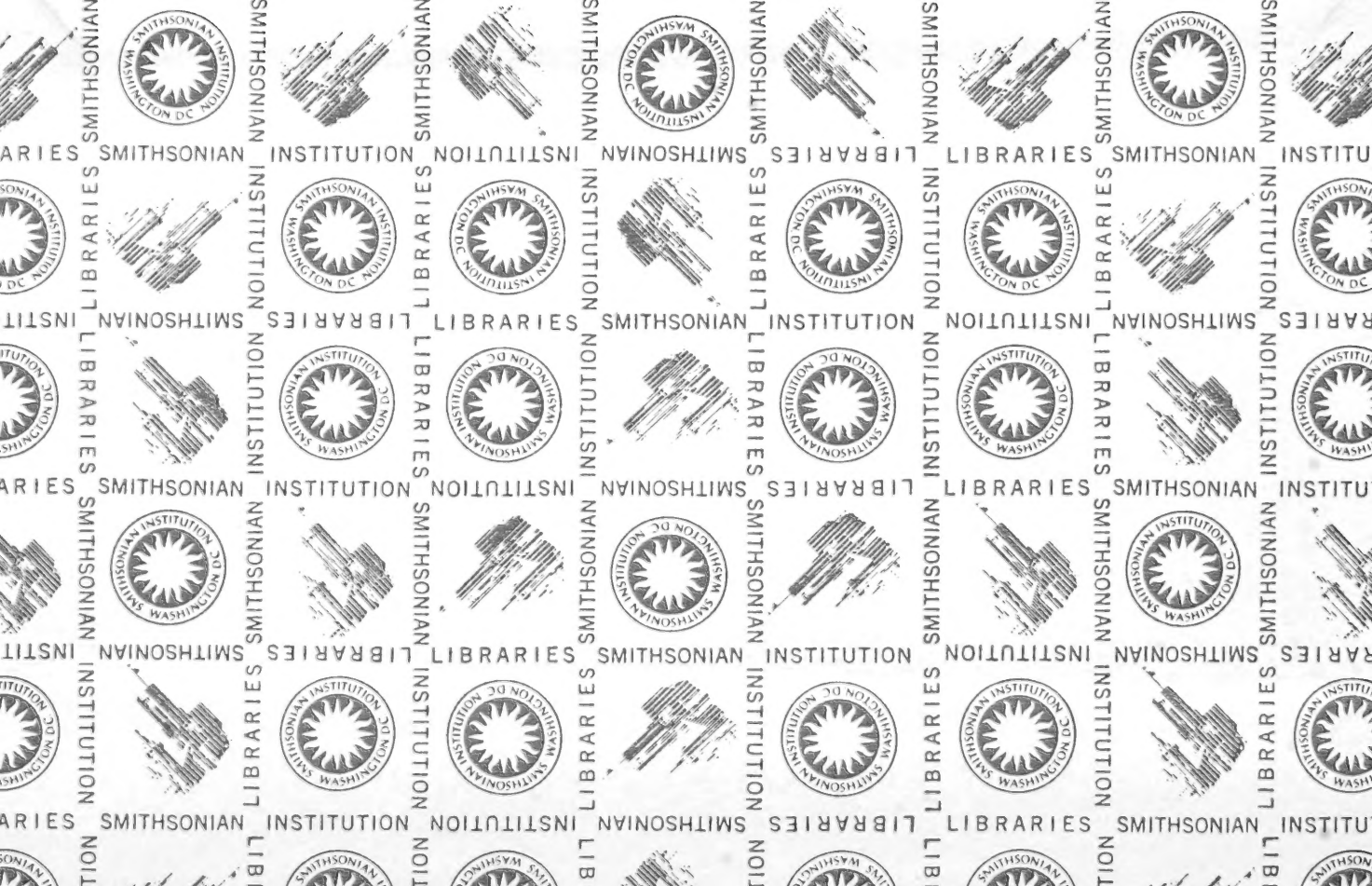
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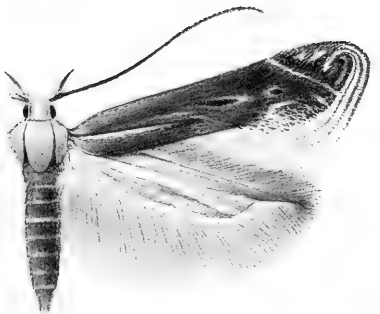

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FIRST BRITISH RECORD OF A GALL MIDGE PEST OF DAY LILY (*HEMEROCALLIS FULVA* L.)

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On 20 June 1989, a sample of flower stems of day lily (*Hemerocallis fulva* L.) was received at the Royal Horticultural Society's Garden, Wisley, from a private garden at Weybridge, Surrey. The flower buds on these stems were considerably enlarged (Fig. 1) and the petals inside the buds were thickened. Affected buds were failing to open and some had turned brown and dried up at an early stage of development. The misshapen buds contained large numbers of small, white gall midge larvae and these samples were forwarded to the CAB International Institute of Entomology for further study. Reference to the European literature on gall midges established that this pest is *Contarinia quinquenotata* (F. Löw) (Diptera:Cecidomyiidae) and this appears to be the first record of this species from the British Isles. The species was originally described from Austria by Löw (1888) and has also been recorded from Sweden, the Netherlands, West and East Germany, Poland, Czechoslovakia, Hungary and Yugoslavia in the *Catalogue of Palaearctic Diptera* (Skuhravá, 1986).

An examination of *Hemerocallis* plants growing in the RHS Garden at Wisley showed that the midge was also present there and widely scattered throughout the Garden's 240 acres (97 hectares). Later in the summer a sample of infested buds was received from another Weybridge garden, close to the first, and a third sample was sent in from Buxted, East Sussex. The latter correspondent said that the problem

Fig. 1. Normal *Hemerocallis* flower buds on the left and gall midge-affected buds in the centre and on the right.

first became apparent in his garden in 1985 so, although *C. quinquenotata* has not been formally recorded in Britain before, it would seem to have been present for several years.

This pest can be very damaging to day lilies, which are popular and generally trouble-free herbaceous garden plants. On some plants at Wisley, especially yellow-flowered varieties, almost every bud was affected in late June, resulting in a very poor display of flowers. Fortunately, there appears to be only one generation of the midge during the summer and flowers produced after late July were not attacked. The fully-fed larvae leave the buds and go into the soil to overwinter and probably do not pupate until the following year.

It seems likely that this pest will become widely distributed through the movement of infested plants and soil. As with most gall midge pests, control will be difficult as the larvae are well protected within the damaged buds or the soil. Immediate removal and destruction of enlarged buds will help to reduce infestations but may not eliminate the pest entirely as lightly infested buds may show little swelling and larvae may persist in the soil for more than one winter. It may be possible to devise effective control measures once the biology of the midge has been studied in more detail.

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BENHS FIELD MEETING

Fig. 1. BENHS Field Meeting to Box Hill, 10 June 1989, with (left to right): Mark Colvin, John Owen, Ian White, Dick Drew (from Brisbane) and Donald Prance.

A MAJOR BREEDING EXPERIMENT WITH TWO ABERRATIONS OF *POLYOMMATUS ICARUS* ROTT., THE COMMON BLUE BUTTERFLY

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A very large-scale breeding experiment with *P. icarus* abs *basielongata* B.&.L. and *antidiscoelongata* B.&.L. has extended over 5 years; the stock is being maintained. From the results of this work the genetic basis of the aberrations can be understood, and it illustrates in a spectacular manner and to an unexpected degree the latent potential for expression in even minor aberrations.

All the breeding work was carried out by L.D. Young and the present analysis is by R.D.G. Barrington.

Methods

This project has involved carefully controlled and intensive inbreeding of butterfly aberrations on a scale not previously attempted. In order to produce the most extreme aberrations in the shortest time possible three generations have been reared each year, and often several different strains have been maintained simultaneously. The numbers in each brood are often very high (up to 1000 specimens). This maximizes the range of variation within the brood, the most extreme specimens of which are used as parents for the next generation. In this way the expression of the aberrant genes can be developed rapidly.

Such a large concentration of livestock attracts predators such as spiders, earwigs, lacewing larvae and mites, and constant vigilance was needed to keep them under control.

The foodplants used were *Medicago lupulina* L. (black medic) and *Lotus corniculatus* L. (birdsfoot trefoil). Apart from keeping up a constant supply of this food, the trefoil has its own inherent problem as a foodplant due to its reaction to being eaten. It will produce and release hydrogen cyanide gas from the eaten edges of leaves. In fact only a proportion of plants in a population can do this and the numbers vary with locality (Ford, 1975). Whilst *icarus* larvae have an enzyme which breaks down the lethal gas and renders it harmless, which may allow them to feed on the poisonous plants with no ill effects in the field, in captivity high concentrations of larvae feed on individual plants and consequently high levels of the gas are released. It appears that at such a high level the larvae are unable to break it all down and so they will abandon the plant and, for lack of an alternative food-source, eat each other! New plants had to be supplied to replace partially eaten but poisonous plants.

To some extent we avoided the worst effects of inbreeding which are often manifested in weak and deformed adults, low fertility and butterflies that will not pair. Such effects are brought about because rare, harmful recessive genes are brought together into the homozygous state in many specimens where the weakening effects of the gene/s can be expressed. We experienced egg mortality sometimes reaching 50%, but the adults produced were healthy. Bleaching and deformity were rare. The relative health of the stock after so much inbreeding is probably because from each brood many insects are used as parents for the next generation rather than a few or a single pair. Therefore although all the offspring are related they are not necessarily siblings and many of the subsequent pairings will be between insects that

are not brother and sister where the worst effects of inbreeding would normally occur. Outcrossing to wild insects to maintain strength is often done in breeding experiments. We rarely did this mainly because the wild-type genes diluted the strength of variation in the stock and several 'wasted' generations were needed to restore it to its former levels.

Results

Precise details of the early broods are given in an earlier paper (Robertson and Young, 1987). The general pattern of results is given below.

Pure strains

The original ab. *basielongata* female was captured in Hampshire on 19.viii.84 (Fig. 1).

In the first generation from the wild captured aberration approximately 50% of the offspring were wild type and 50% *basielongata*, some of which were more extreme than the parent (Figs 3 and 4). An F_2 was reared from aberrant insects only and produced 100% aberrations but none more extreme than the F_1 examples. An F_2 aberration was paired with a wild, type male and gave an F_1 of 50% aberrations as before. Again aberrations only were paired for the F_2 and in this generation 100% of the emergences were *basielongata*. This stock was then inbred up to the F_8 generation always using the best examples of *basielongata* for pairing, and every brood gave 100% *basielongata*. The later generations produced some extreme forms (Fig. 5 (F_6)). The aberrations *arcuata* Courv., *costajuncta* B.&.L., *limbojuncta* Courv. and *basijuncta* B.&.L. appeared in the strain in small numbers and in an apparently random manner.

The original ab. *antidiscoelongata* female was captured in Surrey on 18.vi.85 (Fig. 2).

The F_1 generation from the wild aberration contained examples ranging from typical through to minor aberrations (Fig. 6) none as well developed as the aberrant parent. The insects formed a graded series with no clear segregation into type and aberrations. The F_2 showed a similar pattern. These F_2 aberrations were generally not much more developed than those of the F_1 except for one extreme ab. *antiradiata* B.&.L. (*Proc. Trans. Br. Ent. Nat. Hist. Soc.* 20:plate III facing p. 43, Fig. 15). The strain was inbred until the F_8 generation. Extreme examples of *antidiscoelongata* began to appear in the F_4 (Fig. 7) and in increasing numbers and in a developed form as the broods progressed (Figs 8 (F_5), 9 (F_5) and 10 (F_5)). The specimen illustrated in Fig. 9 was the only example in the whole breeding experiement to show inward raying of those hindwing spots not connected with the *costajuncta*, *limbojuncta*, *basijuncta* complex. In these later generations the specimens continued to show a wide range of forms from type to extreme aberrations in a continuous series, although type insects decreased and aberrations increased in numbers over the project until the later generations were more or less pure breeding for the *antidiscoelongata* character. As with the *basielongata* stock the four aberrations *arcuata*, *costajuncta*, *limbojuncta* and *basijuncta* appeared randomly.

Crossing the two forms

Good examples of *basielongata* and *discoelongata* were paired to produce an F_1 in May 1987. A proportion of the specimens showed the *basielongata* character and the whole brood was a graded series for *discoelongata* from type to good forms. In general all aberrations, whether of the single or double form, were less well

developed than their respective parents although well developed in comparison with the original wild-caught insects. Inbreeding was continued only with insects showing the double aberration, from which very strong combinations began to occur by the F_3 (Figs 11 and 12). As the inbreeding continued always using the most extreme specimens as parents, the expression of both forms became more extreme. *Basielongata* occurred in 100% of the F_2 (and all subsequent generations) while, as in the pure breeding strain, the *discoelongata* character occurred as a graded series becoming more extreme and more frequent relative to the type form until almost all specimens showed the aberration in some degree in the later generations. Because the *discoelongata* character occurred in no fixed proportions, single and double aberrations continued to occur, both in extreme forms as the broods progressed (Figs 13 (F_6), 14 (F_7), 15 (F_7) and 17 (F_8)). By the second generation of 1989 (the F_8, which is the last brood covered in this paper) the *discoelongata* character had become so exaggerated in some specimens that it was almost classifiable as *antiradiata* and was not much different from the extreme *antiradiata* that appeared in the F_2 of the pure *antidiscoelongata* strain.

The F_8, apart from producing some very good combination forms, also contained two exceptional aberrations. One was a very striking male *alba-radiata* B.&.L. (Fig. 16) and the other a unique female *basielongata-caeca* B.&.L. exhibited at the 1989 Annual Exhibition (*Br. J. Ent. Nat. Hist.* **3**: plate III, Fig. 7).

The random appearance of the four minor streaked aberrations continued as well as the occurrence of minor forms of ab. *transversa* B.&.L. in which two spots are joined vertically across a vein (Fig. 15). These *transversa* were noted mainly in the later broods.

Analysis

Ab *basielongata* appears to be a dominant gene. The occurrence of a 1:1 ratio of aberrations to type in both F_1 generations from the wild aberration (which may be assumed to have paired with a typical male) and in the F_1 from a bred aberration crossed with a wild, type male strongly suggests that the aberrant parents were heterozygous for the dominant (aberrant) gene. The F_2 generations both showed 100% aberrations. However, problems with poisonous foodplant meant that crippled specimens made scoring for wing patterning difficult, and the small broods were not large enough for the results to be statistically significant. Small broods often show a bias in numbers for type or aberration because there are not enough insects to get a reliable spread of the forms. If the gene for *basielongata* were a pure dominant, one would expect a 3:1 ratio of aberration to type in these F_2 generations but in small broods it is quite possible for the ratio to be biased to give 100% aberrations.

The subsequent broods after the F_2 gave 100% aberrations suggesting a dominant form, but the results of the F_1 generation from the crossing of *basielongata* and *discoelongata* suggest that it is not a pure dominance. The *basielongata* parents for this brood came from the sixth pure-bred generation of the form so one can assume that all specimens were homozygous for the aberrant genes. This being so, all specimens in the F_1 generation from the crossing of the two forms would be heterozygous for the *basielongata* gene, and if the gene were a pure dominant every specimen in the brood should show the characteristic. That some specimens were typical for this characteristic would indicate that *basielongata* is a gene which, although dominant has not achieved complete dominance over the type form so that type characteristics may be expressed in some specimens in the heterozygous state.

The results from ab. *antidiscoelongata* also conform closely to an expected result. Robertson and Young (1987) have previously suggested that it is a simple recessive.

Further examination of the specimens and the results of broods achieved since their conclusions were drawn suggest that the situation is somewhat more complex. It appears to be an example of polygenic (or multifactorial) control. Instead of being controlled by a single mutant gene, the aberration involves several such genes which can work together showing an additive effect. Each gene involved acts like a simple aberrant gene being dominant or recessive to the type form, but there are several of them and they may be a mixture of dominants and recessives (Ford, 1936; Kettlewell, 1973).

With polygenic control all the genes will be in the heterozygous state in an F_1, so that only those genes that are dominant will exert their effect, but it will not be a complete effect as the recessive genes will not be expressed. The F_1 will consist of a graded series from type through to aberrations no more extreme than the parent, usually less so. The F_2 will show a similar pattern but with some of the recessive genes in the homozygous state as well as some homozygous dominants, so more extreme aberrations may occur. In both generations it would be difficult to give ratios of aberrations and type insects because of the continuous nature of the series. In subsequent generations using only the best aberrations for pairing more and more of the genes would come together in the homozygous state in the same insects and so more extreme aberrations would be produced and the proportion of type insects would be reduced, eventually to zero. This matches very closely the results obtained in breeding from *discoelongata*.

Polygenic inheritance is one of the most common modes of expression of variation and occurs in a wide range of butterfly aberrations such as *Lysandra coridon* Poda (chalkhill blue) ab. *marginata* B.&L. (in which the black border of the upperside of the male insect spreads across the wings) and *Pyronia tithonus* (hedge brown) L.ab. *excessa* Leeds (with extra forewing spots), both of which have been bred by R.C. Revels.

The range of expression of genes

The series of broods has illustrated the variation in expression of the genes. Although a gene may be a simple recessive or dominant and may have a clear-cut effect on the wing pattern, the range of its effect may vary considerably. A very good example of this is *Papilio machaon* L. (swallowtail) ab. *obscura* Frohawk; a heavily melanic form totally dusted with black scaling. This was bred many years ago by L.H. Newman and proved to be a simple recessive. However the melanic specimens that were reared in the F_2 were very variable. Some were dusted with black with the underlying pattern showing through clearly. Others were covered in thick black scaling with virtually no pattern visible. At first glance they appear to be different forms, although they are just different expressions of the same gene (Newman, 1960).

It is possible to select so that, although all aberrations in a brood are controlled by the same gene/s only the most extreme are used for breeding (ie selecting the genes that are being expressed most fully). A strain can then be built up in which the gene is always in an extreme state of expression. One of the earliest and clearest demonstrations of this in Lepidoptera was with *Angeronia prunaria* L. (orange moth). In the type form the adult is of a uniformly orange colour. Ab. *corylaria* Thunb. has the orange restricted to a central band on all four wings by dark scaling. The aberration is controlled by a single dominant, but highly variable gene. By selective breeding, strains can be produced in either direction — with an excessively wide orange band or with the orange restricted to a spot on each wing. The two extremes appear quite different but are under the control of the same dominant gene (Williams, 1946). This situation is possible partly because there is variability in the effectiveness of individual genes and partly because gene expression is often

modified by other genes (modifiers), so selective breeding will work on both the individual gene and on its modifiers to produce a combination that allows the aberrant gene to be expressed most fully.

The present experiment has done just this. With the *discoelongata* character, for example, in the later generations most specimens would probably have all had the aberrant genes in a homozygous state so they are all being expressed. However the strain is still progressing, with more and more extreme aberrations appearing. In the early broods selection would mainly have been for specimens with the most genes in a homozygous state. In the later broods, when all genes were homozygous, selection would have been for the most extreme genes. The most developed aberrations that have appeared in this series of experiments bear little resemblance to the original parents, but they are under the same genetic control.

Crossing the two forms showed how this selection had worked. When the initial cross was made between good *basielongata* and *discoelongata* each aberration would probably have had type genes for the other aberration. Effectively each aberration was being paired to a type insect (for that character). However in the F_1 from that cross, aberrations occurred that were more strongly expressed than the aberrations in the original F_1 generations from the wild aberrations although they were effectively the same thing (in those original F_1 specimens and in the F_1 specimens from the crossed forms all the aberrant genes would be in a heterozygous state). This happened because since the original F_1 generations from the wild aberrations selection had occurred for those genes that were most strongly expressed, and while none of the recessive genes would have been expressed in any F_1 generation, the dominant genes were expressed and they had been 'strengthened' by the time the F_1 from the cross of the aberrations occurred.

The only comparable experiment to the present one on a British butterfly was done by P.M. Sheppard (Ford, 1945) in which starting with a minor aberration, he inbred the darkest examples of *Euphydryas aurinia* Rott. (marsh fritillary) in his broods for 14 years. Towards the end of the experiment some extremely dark forms were emerging (ab. *bicolor* Wehrti). An example of this aberration is very well illustrated by A.D.A. Russwurm (Howarth, 1973). More extreme forms than the illustrated example were bred but by this time inbreeding was beginning to take a serious toll and deformities were common. As with *icarus* ab. *discoelongata*, *bicolor* was under polygenic control.

The present experiment has now gone beyond 14 generations and involves two aberrations. It will be of great interest to see just how far the markings can be developed in further generations.

The radiata *forms*

As previously mentioned two extreme *radiata* forms have appeared in the stock. The female *antiradiata* from the F_2 of the pure bred *discoelongata* is clearly a very extreme expression of *discoelongata* with the spots being exceptionally large and streaked, and it is now being approached by specimens reared in the most recent broods. That it occurred so early in the experiment must be put down to the fact that a chance combination of genes in the polygenic system occurred which allowed for extreme expression of the *discoelongata* character. Inbreeding now means that this chance combination is occurring with some regularity.

The *alba-radiata* from the F_8 of the crossed forms may be something different. Certainly no similar hindwing variation has appeared before in these experiments. White ground-colour often goes with extreme spotting forms and may be part of the expression of *radiata* in some specimens. It may well be a spontaneous mutation

which can occur when a strain is maintained and inbred for many generations. This occurred in a culture of *Pieris brassicae* L. (large white) maintained by B.O.C. Gardiner (Gardiner, 1962). After about 80 generations the abs *coerulea* Gardiner and *albinensis* Gardiner suddenly appeared. The former has a pale blue ground colour, and the latter is albinistic (see Russwurm, 1978). Both were simple recessives. Alternatively it could be the most extreme expression of the *discoelongata* series, the hindwing character only appearing with a specific gene combination. With luck further breeding from this strain will prove the point one way or the other.

The inward rayed hindwing form from the F_5 of the pure-bred *discoelongata* series bears no relation to any other aberrations in the experiment and is most likely to be a spontaneous mutation.

Other aberrations in the stock

A bilateral gynandromorph was bred in the F_5 generation of the crossed forms (*Br. J. Ent. Nat. Hist.* **2**: plate IV, facing p. 48, Fig. 2). It is caused by imperfect gene separation in the first cellular division in the egg. This is a chance phenomenon and is not related to the rest of the experiment.

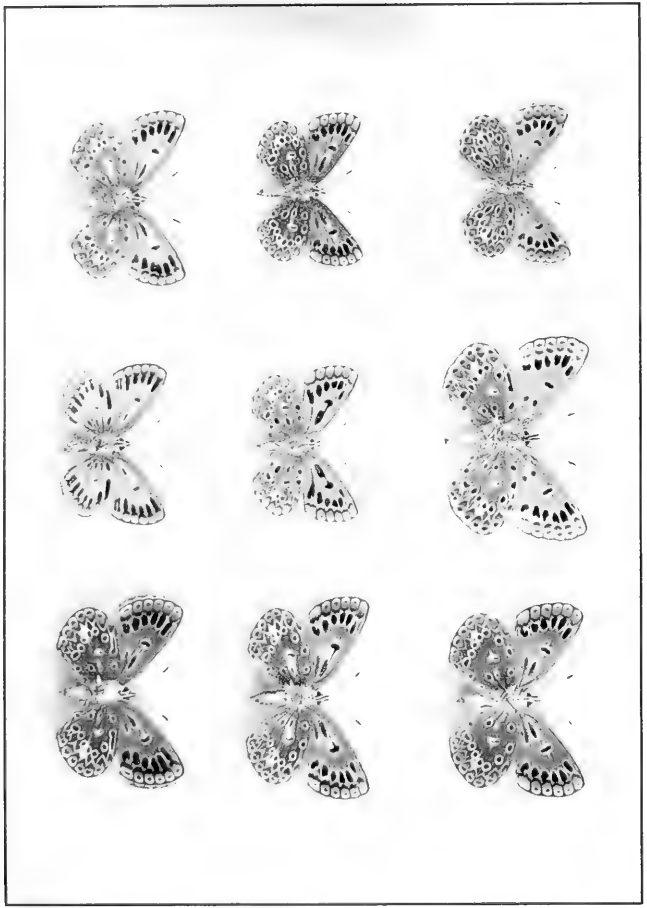
The aberrations in the *arcuata* complex (including ab. *arcuata*, *costajuncta*, *limbojuncta* and *basijuncta*) appeared randomly in the experiment. Nothing firm can be said about their genetics, although three of them (excluding *limbojuncta*) seem to be connected in some way. R. Barrington has bred all three in an F_1 from a *basijuncta* female and L. Young has had similar results (Robertson & Young, 1984). They are probably not connected to the *basielongata* and *discoelongata* forms, but being common enough forms in the field, they may have 'been in the genes' of the captured female aberrations or the males with which they had paired. *Limbojuncta* is a much rarer form in the field and rarely occurs by itself, more often occurring on specimens showing extreme fore or hindwing forms. It is less likely that it happened to be in both wild stocks. It may have some connection with the *basijuncta* and *discoelongata* forms. Robertson & Young (1987) suggest an environmental influence on the occurrence of the *arcuata-costajuncta-basijuncta* complex in combination with a genetic basis. This may well be so, but the whole complex requires more work before it can be understood.

A single female ab. *caeca* occurred in the F_8 of the crossed forms, no sign of spot obsolescence having been seen before in the strain. It is not a rare form in *L.coridon* and *L.bellargus* Rott. (adonis blue) but is more so in *icarus*. In the former two species it is almost invariably associated with a weakness manifested in 'shot-holed' or crumpled wings. I have not seen enough of the form in *icarus* to make a similar generalization, although the present specimen and a male of the form taken by R. Barrington in Eire in 1984 were quite perfect. The *icarus* example here may have occurred as the result of a weakness in the strain caused by inbreeding. But as it is perfectly formed and of normal size, it is more likely that it was due to a spontaneous mutation.

Ab. *transversa* is a form usually associated with a weakness which causes venational defects. The veins appear to act as boundaries for individual spot markings so any vein reduction will allow spots to join vertically down the wing. Only minor forms involving two spots occurred, probably due to a low level of inbreeding weakness.

Conclusions

The experiment has demonstrated the inheritance of the aberrations *basielongata*



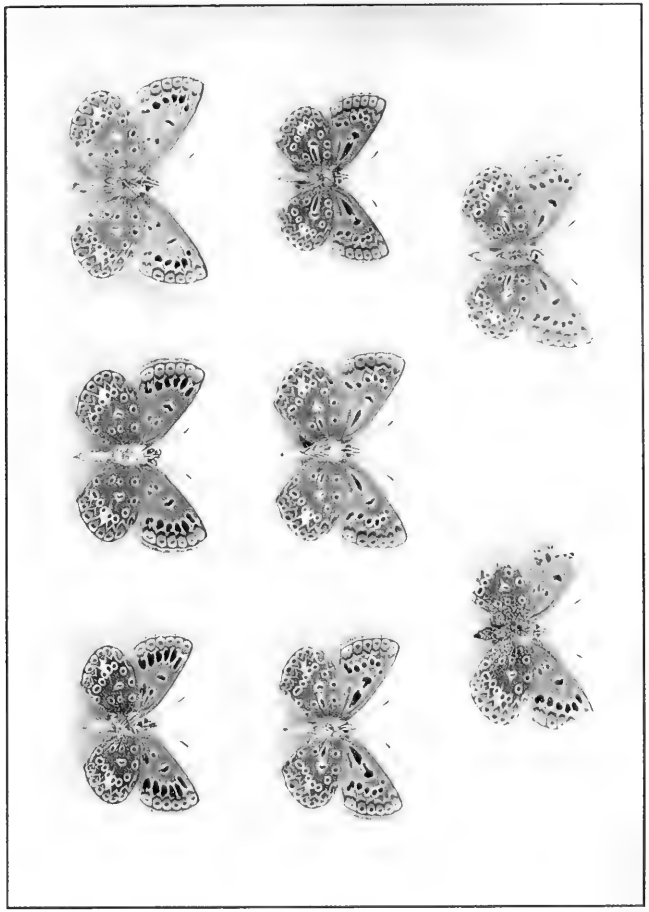
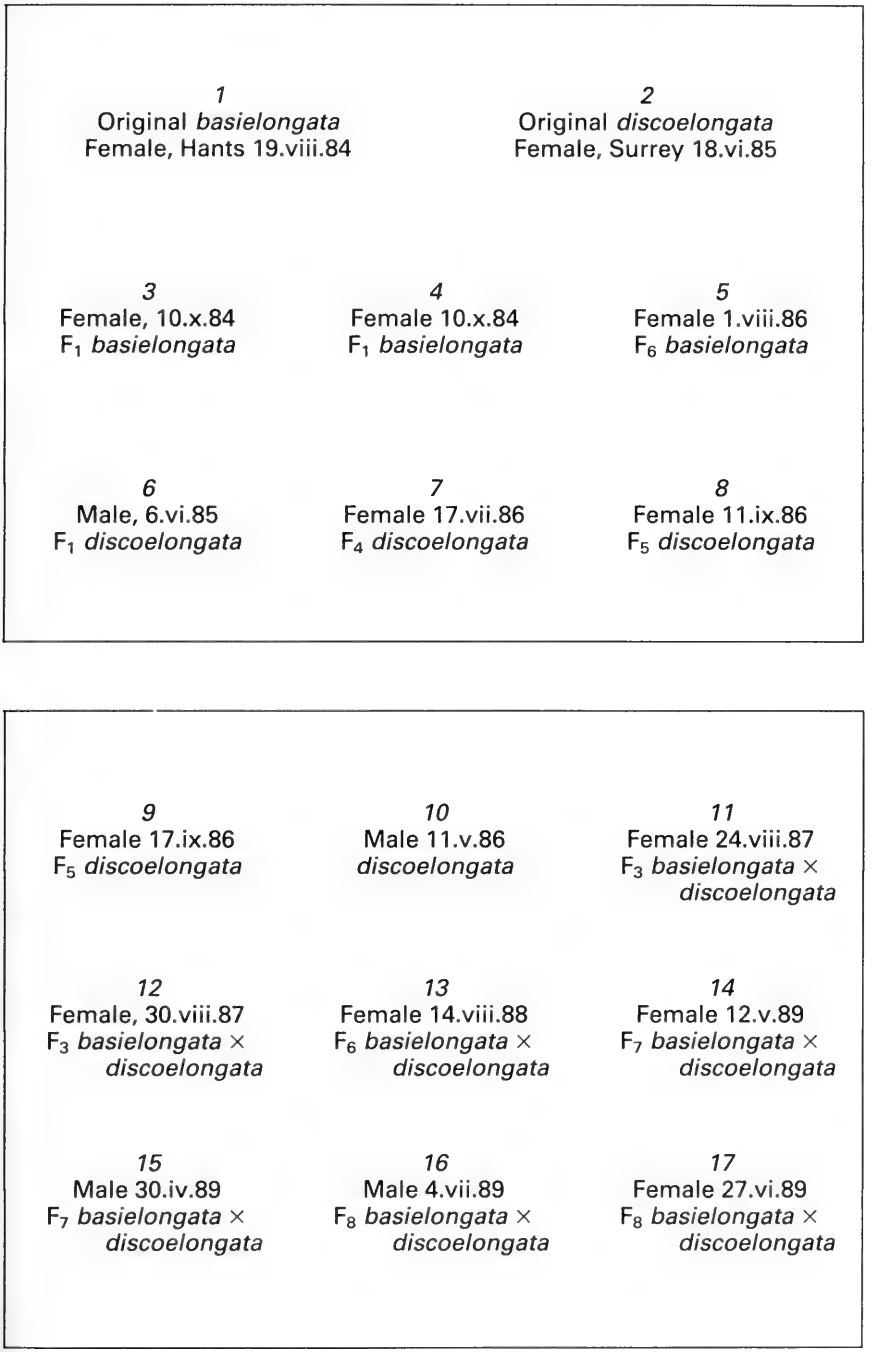


PLATE I. Barrington and Young. 1990.



1
Original *basielongata*
Female, Hants 19.viii.84

2
Original *discoelongata*
Female, Surrey 18.vi.85

3
Female, 10.x.84
F_1 *basielongata*

4
Female 10.x.84
F_1 *basielongata*

5
Female 1.viii.86
F_6 *basielongata*

6
Male, 6.vi.85
F_1 *discoelongata*

7
Female 17.vii.86
F_4 *discoelongata*

8
Female 11.ix.86
F_5 *discoelongata*

9
Female 17.ix.86
F_5 *discoelongata*

10
Male 11.v.86
discoelongata

11
Female 24.viii.87
F_3 *basielongata* × *discoelongata*

12
Female, 30.viii.87
F_3 *basielongata* × *discoelongata*

13
Female 14.viii.88
F_6 *basielongata* × *discoelongata*

14
Female 12.v.89
F_7 *basielongata* × *discoelongata*

15
Male 30.iv.89
F_7 *basielongata* × *discoelongata*

16
Male 4.vii.89
F_8 *basielongata* × *discoelongata*

17
Female 27.vi.89
F_8 *basielongata* × *discoelongata*

and *discoelongata* to be, respectively, dominant and polygenic. It has also shown how selection can act at the gene level to modify the expression of individual genes.

By producing extreme aberrations from original wild-caught butterflies that were minor forms in *icarus*, the experiment suggests that similarly spectacular results might be possible with other aberrations and in other species.

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BOOK REVEIWS

Hadleigh Great Wood. The wildlife and history of Belfairs Nature Reserve, edited by B.M. Spooner and J.P. Bowdrey. 278 pages, paperback, £6.75, South Essex Natural History Society, 1988.—The editors (who are also the two major contributors) have produced a delightful and interesting account to celebrate the 50th anniversary of the reserve. It is though, destined to be uneven in its coverage, reflecting the interests and energies of the various contributors. The flora (by Betty Matson) is excellent, listing 390 species, as are the Bryophytes (by T. Pyner) and the fungi (569 species!—by Spooner). All invertebrate groups are covered, and of the insects the Lepidoptera (by D.G. Down) are best covered—the butterfly section makes especially good reading. The lists of Syrphidae (by R.G. Payne) and plant galls (by J.P. Bowdrey) are also good. The vertebrates are well written up, especially the birds by D.W. Landbrook. The whole thing is prefaced by a comprehensive introduction on topography, geology, history, conservation and management. Various appendixes cover reports of storm (16.x.87) damage, historical personalities and the murder! All in all, a very useful book, full of information and anecdote. The layout and printing leave quite a little to be desired, but at this price it is still a good buy. Copies are available from SENHS, 75 St Mary's Road, Benfleet, Essex.

Provisional atlas of the hoverflies of Essex, by R. G. Payne, 34 pages, A4, Southend Museums Service, Central Museum, Victoria Avenue, Southend-on-Sea, SS2 6EW, 1989, £2 + 30p P. & P.—Covers 161 species, with comments and maps for each, plus notes on various species not recorded since 1970.

R.A. Jones

PROBLEM GENERA CLOSE TO *MEGASELIA* (DIPTERA: PHORIDAE)

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In practice taxonomists construct both identification keys and classifications of species. Unfortunately there has been a tendency to confuse these two exercises. The results of such confusions are poorly constructed keys and unsound classifications. It is now generally agreed, however, that 'synapomorphy is the secret of sound classification whereas clear characterisation is the essence of a good key' (Disney, 1983*b*).

A character of great value in classification may be an impediment in identification. For example Dufour's crop mechanism in the females of some Phoridae is a major character in classification, allowing characterization of the Megaseliini (Disney, 1987, 1989), but it is not user-friendly in an identification key. Conversely the lack of wings in many female Phoridae is an excellent identification character (e.g. Disney, 1983*a*) but of little value in classification, because the loss of wings has clearly occurred many times independently during evolution. The presence of wings is plesiomorphic, and therefore this character state is of no value in classification.

The present classification of Phoridae is a prime example of the confusions highlighted above. Many of the classificatory divisions in the literature (e.g. Schmitz, 1929) can be traced back to couplets in Becker's (1901) identification keys, and keys derived from these (e.g. Lundbeck, 1922). The result is an essentially typological classification. If it were to be applied consistently, such that a good key was automatically a reflection of the classification, then there might be some advantage. However, contrary to their professions, typological taxonomists tend to ignore their own principles in practice. For example Borgmeier (1957) wrote 'I am convinced, with Blackwelder and Boyden, that the introduction of evolutionary concepts into systematics has produced great confusion. The systematist may not be anti-evolutionary, but in practice he is non-evolutionary'. Such statements summarized and made explicit his endorsement of typological classification. He then proceeded to add species to genera on implicitly non-typological grounds, so that the generic concepts themselves 'evolved' to the point where they can no longer be clearly characterized. For example he added *Veruanus verus* Borgmeier (1971) to the genus *Veruanus*, thereby radically changing the generic definition (see below). Such practice cannot be defended in terms of typological principles.

In a phylogenetic classification it is accepted that some members of a monophyletic genus may entirely lack characters both possessed by species closer to the ground plan and which are useful in identification. When constructing a key such inconveniences are got around by running different segregates within a genus to different couplets in a key to genera.

The present situation in the Phoridae is that we possess a typological classification, derived from early identification keys, which has become steadily more unwieldy as generic concepts have altered with the addition of ever more species which will not run out cleanly when taken through existing keys to genera. On top of this a new species has frequently been assigned to a new genus because of a morphological gap between it and an already existing genus. However, the discovery of further new species that bridge the gap has not always been followed by the suppression of the 'new' genus. Furthermore numerous genera have been described on the basis of one

sex only, and the subsequent discovery of the missing sex has frequently revealed no morphological gap between it and a related genus.

A measure of the current situation is provided by the following statistics. The most recent key to phorid genera of the world is that of Schmitz (1929). It deals with 90–100 genera, some of which have subsequently been synonymized with others. Today there are 234 genera recognized. Of these 54% are only known in one sex.

Undoubtedly the most confused area of Phorid taxonomy is the recognition of genera in the Metopininae, particularly with regard to those genera which resemble the enormous, and morphologically diverse, genus *Megaselia* Rondani. This paper aims to clarify the recognition of 'genera' in part of this complex for the Palaearctic fauna. The first priority is to facilitate recognition of genera, as presently understood. Only then will one be in a position to re-evaluate these genera. This work has been prompted by two new species which fail to key out unequivocally to a genus in Schmitz's (1941) keys to genera for the Palaearctic fauna, in his (1929) keys to world genera, or in the keys to Nearctic genera (Peterson, 1987, amended by Brown, 1988).

In Schmitz's (1941) keys both the new species run to the group of genera covered by his couplets 8–13 on page 83. To this section must be added *Anticofimbria* Schmitz (1951), which keys out at lead 2 of couplet 13. To couplet 10 lead 2 must be added *Trophithauma* Schmitz (Gotô, 1984), as well as the males of *Microselia* Schmitz (Disney, 1988). The latter also key out at lead 1 of couplet 13. Couplet 10 lead 2 needs further amendment by deletion of *Plastophora* Brues, which has been synonymized with *Megaselia* (Disney, 1986). The new species from Israel also keys out at couplet 10 lead 2, but does not readily fit into any of the six genera that also key out to this lead. The new species from Poland keys out at couplet 13 lead 2. It is clearly not a member of the genus *Anticofimbria*, assuming this is a valid genus. If, on the other hand, it is assigned to *Megaselia* then the concept of this genus becomes wide enough to embrace most of the other genera in this entire section.

In order to progress, the following provisional key is offered as a means of recognizing the genera as presently understood in the literature.

Key to Palaearctic genera resembling Megaselia

1. Males 2
— Females 20
2. Hind tibia with an antero-dorsal row of bristle-like hairs as well as a postero-dorsal row (separated by the dorsal hair palisade) 3
— Hind tibia with no differentiated antero-dorsal bristle-like hairs 4
3. Palp bristles only about size of upper occipitals. Proctiger with a pair of apical, finely-feathered bristles, which are clearly more robust than hairs on cerci ..... *Phalacrotophora*
— Palp bristles stronger, with at least one being clearly more robust than upper occipitals. Hairs at apex of proctiger little, if any, stronger than those on cerci ..... *Megaselia* (part)
4. Third antennal segment drawn out into a long point, with a much shorter apical arista ..... *Tubicera*
— Third antennal segement rounded or oval, with a long arista 5
5. Mesopleuron with hairs, and sometimes with one or more bristles as well 6
— Mesopleuron bare 11
6. Vein 3 unforked 7
— Vein 3 forked 8

7. With more than 4 supra-antennal bristles ..... *Anticofimbria*
— With at most 4 supra-antennal bristles ..... *Megaselia* (part)
8. Mesopleuron with at least one long bristle, at posterior margin, in addition to hairs 9
— Mesopleuron with hairs only 10
9. Anal tube long and slender (Figs 12 and 13); it being half as long again as length of dorsal face of epandrium, and having its maximum width at apex of cerci. Hairs at tip of proctiger clearly more robust than those on cerci..... *Menozziola*
— Anal tube more robust, and usually much shorter. Hairs at tip of proctiger usually less robust ..... *Megaselia* (part)
10. Costal index less than 0.4. Costal section 1 more than twice as long as sections 2 + 3. Fore tarsal segment 5 clearly longer than segment 4. Anal tube relatively long, in relation to length of epandrium. Haltere knob dark..... *Lepta*
— Without these characters in combination ..... *Megaselia* (part)
11. Metatarsus of front leg at most as long as segment 5 ..... *Pseudacteon*
— Metatarsus of front leg distinctly longer than segment 5 12
12. Third antennal segment clearly longer than broad 13
— Third antennal segment hemispherical to spherical..... 17
13. Vein 3 unforked..... 14
— Vein 3 forked 15
14. Anal tube clearly longer than dorsal face of epandrium and somewhat slender (similar to Fig. 15) ..... *Veruanus*
— Anal tube at most as long as dorsal face of epandrium, and much broader than as in Fig. 15.....*Microselia* (part)
15. Fifth tarsal segments of front and middle legs a little to clearly longer than fourth segments (e.g. Fig. 3) 16
— Fifth tarsal segment subequal to or shorter than fourth segment on both middle and front legs ..... *Megaselia* (part)
16. Hind femur slender, but with a triangular basal process (Fig. 5) ... *Razorfemora*
— Hind femur normal (Fig. 4).....*Microselia* (part)
17. Vein 3 unforked..... 18
— Vein 3 forked 19
18. Anal tube clearly longer than dorsal face of epandrium, and somewhat slender (Fig. 15)..... *Styletta*
— Anal tube shorter and more robust ..... *Megaselia* (part)
19. Vein Sc with apex confluent with R1 ..... *Trophithauma* and *Megaselia* (part)
— Vein Sc with apex free, and not reaching R1..... *Megaselia* (part)

[*Note*. It is not clear how *Trophithauma* males can be distinguished from *Megaselia*.]

20. Hind tibia with an antero-dorsal row of bristle-like hairs as well as a postero-dorsal row (separated by the dorsal hair palisade) 21
— Hind tibia with no differentiated antero-dorsal bristle-like hairs 22
21. Palp bristles only about size of upper occipitals. Abdominal tergite 3 with an oval to subcircular papilla each side near front margin (Fig. 6) .*Phalacrotophora*
— Palp bristles stronger, with at least one being clearly more robust than upper occipitals. No oval papillae on abdominal tergite 3 ..... *Megaselia* (part)
22. Last tarsal segment of front leg about twice as long as segment four, and clearly tapered (e.g. Fig. 2) 23
— Last tarsal segment of front leg not as elongated, and not obviously tapered.. 24
23. Mesopleuron bare ..... *Microselia*
— Mesopleuron with hairs ..... *Lepta*

24. Metatarsus of front leg at most as long as segment 5 ..... *Pseudacteon*
— Metatarsus of front leg a little to clearly longer than segment 5..... 25
25. Mesopleuron with hairs 26
— Mesopleuron bare 31
26. Vein 3 unforked..... 27
— Vein 3 forked 30
27. Mesopleuron with hairs only 28
— Mesopleuron with clearly differentiated bristles near hind margin, as well as hairs 29
28. Arista pical..... [*Tubicera*]
— Arista dorsal, sometimes just pre-apical ..... *Megaselia* (part)

[*Note.* The female of *Tubicera* is not known. It is being assumed there is no sexual dimorphism in the position of the arista.]

29. With more than 4 supra-antennal bristles ..... *Anticofimbria*
— With at most 4 supra-antennal bristles ..... *Megaselia* (part)
30. Base of ovipositor with a pair of finger-like processes (Fig. 9) ..... *Menozziola*
— No such processes ..... *Megaselia* (part)
31. Vein 3 unforked..... 32
— Vein 3 forked 33
32. Veins 1 and 3 almost parallel (Fig. 14) ..... *Styletta*
— Veins 1 and 3 more divergent ..... [*Veruanus*] and *Megaselia* (part)

(*Note.* The female of *Veruanus* is not known.]

33. Epistoma clearly longer than broad. Abdomen with conspicuous finger-like processes which are weakly haired and bare at tip..... *Trophithauma*
— Epistoma broader than long. If abdomen has finger-like processes they are strongly haired and have the strongest hair at apex (Fig. 10)..... *Razorfemora*] and *Megaselia* (part)

[*Note.* The female of *Razorfemora* is not known. The male lacks differentiated bristles on the palps and supra-antennals; if likewise in the female this would distinguish it from *Megaselia*. The hind femora are likely to be sexually dimorphic.]

Discussion

It is evident from the key that this complex to some extent resembles a matrix of *Megaselia* embracing the other genera. The central question, that only future research can resolve, is to what extent are the latter segregates monophyletic genera, as opposed to species groups within *Megaselia*? It seems probable that some are merely further examples of the wide morphological diversity to be found within the genus *Megaselia*.

The comments below aim to highlight features for future investigation as well as to describe the two new species and justify their provisional generic assignments.

Anticofimbria Schmitz, 1951

The type-species, *A. orientis* Schmitz, is the only known member of this genus. It is only known in the male sex. The supernumerary supra-antennal bristles would seem somewhat inadequate grounds for separating this species off from *Megaselia*. It is now known that specimens with supernumerary supra-antennals occur as mutants in species of *Megaselia* which normally have two or four such bristles (e.g. Disney, 1990). Until the female is procured, however, it would be unwise to re-evaluate this

genus. In particular the presence or absence of Dufour's crop mechanism in the female needs documenting.

Lepta Schmitz, 1938

The type species, *L. mendesi* Schmitz, is the only known member of this genus. The modification of the last tarsal segments of the middle and front legs of the female is undoubtedly an apomorphic character. The placement of *Lepta* in a separate genus to *Microselia*, on the basis of the hairing of the mesopleuron, implies that the tarsal character is either a synapomorphy linking these two genera or else an example of homoplasy. The former seems more parsimonious. *Microselia* has no Dufour's crop mechanism in the female (Disney, 1987). Whether it is present or absent in *Lepta* remains to be determined. Future research also needs to seek out apomorphic characters distinguishing the males from related genera, and *Lepta* and *Microselia* from each other, if these are to be maintained as separate genera.

Megaselia Rondani, 1856

This huge genus is probably paraphyletic as it is presently understood (Disney, 1989). Related genera need to be clearly characterized, and justified by the discovery of apomorphic character states. Likewise future research needs to characterize the genus *Megaselia* and highlight its autapomorphic features.

Menozziola Schmitz, 1927

This genus is still poorly known in the Palaearctic Region, but I have a series of the type species, *M. schmitzi* (Menozzi), from France. It is evident that the supposed difference between *M. schmitzi* and *M. camponoti* Schmitz (1934) cannot be sustained. In *M. schmitzi* vein 4 is said to originate at the level of the forking of vein 3, whereas in *M. camponoti* it originates before the fork. In the series of males from France, with identical hypopygia, this character is variable. I thus synonymize *M. camponoti* with *M. schmitzi* — **syn. nov.**

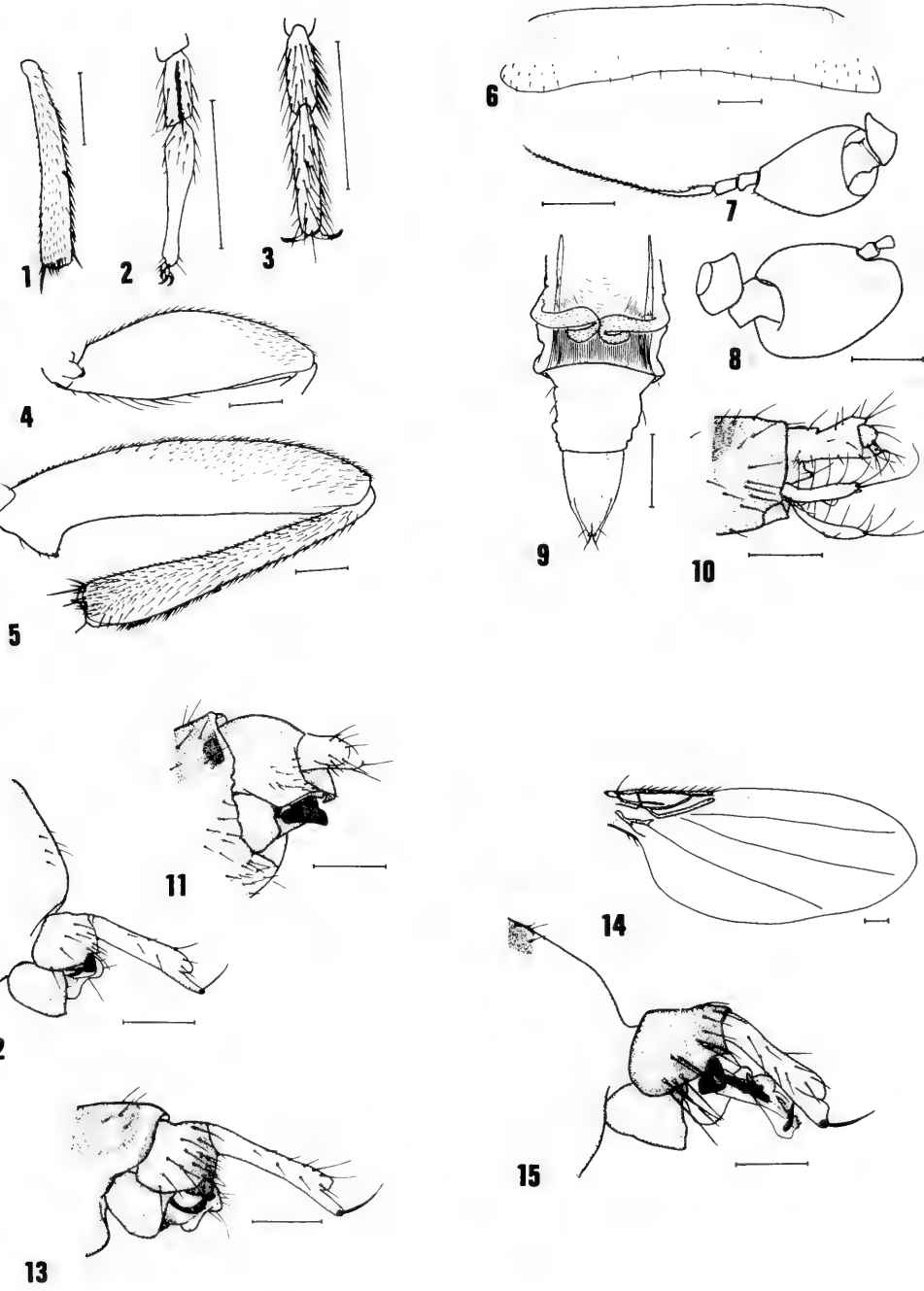
The three Palaearctic species can be distinguished as follows.

1. Hind tibia with three spine-like postero-dorsals in upper two thirds.....*serialis* Schmitz
— Hind tibia with only one spine-like postero-dorsal in upper two thirds (Fig. 1)... 2
2. Legs dark yellow-brown. Male hypopygium as Fig. 13 ..... *obscuripes* (Schmitz)
— Legs pale brownish-yellow. Male hypopygium as Fig. 12 .....*schmitzi* (Menozzi)

Brown (1988) records an undescribed species of this genus (as '*Mennoziola*' in error) from the Nearctic region.

Microselia Schmitz, 1934

Whether this genus should include *Lepta mendesi* is discussed above. For coverage of the Palearctic species Disney (1988) should be consulted.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Phalacrotophora Enderlein, 1912

The type material of the type species was destroyed in the Second World War. Until neotype material is available it will not be possible to evaluate whether it is congeneric with the Palaearctic species assigned to this genus. These Palaearctic species are covered by Delage and Lauraire (1974), amended by Disney (1979, 1983*a*).

Pseudacteon Coquillett, 1907

The abbreviated fore metarsus character, employed in the key above, seems to characterize all the Palaearctic species. However it is not found in some Nearctic species, including the type species *P. crawfordi* Coquillett. This, along with other data, suggests that *Pseudacteon*, as conceived at present, may not be monophyletic.

The Palaearctic species are covered by Schmitz (1938) and Disney (1983*a*).

Razorfemora gen. nov.

Type species **Razorfemora nussbaumi** sp. nov.

Diagnosis (Male only).

Frons without supra-antennal bristles. With standard 4-4-4 bristles and a pair of ocellar bristles, but the antials are reduced and the outer postero-lateral bristles are reduced to hairs. Median furrow present but weak. Palps short with hairs only. Third antennal segment a little elongated (1.3 × as long as broad in type species) with dorsal arista. Proboscis short. Thorax with mesopleuron divided and bare. Anal tube shorter than epandrium, and proctiger with end hairs about as robust as strongest hairs on cerci. Hind femora slender and with a triangular basal process. Hind tibia with a dorsal longitudinal hair palisade and scarcely differentiated postero-dorsal hairs. Vein 3 forked. Sc present.

Etymology. The generic name refers to the appearance of the hind femora.

Systematic affinities. The principle presumed apomorphic features are the lack of supra-antennals, the lack of differentiated bristles on the palps, the dorsal arista, and the slender hind femora with a basal process. Otherwise this genus closely resembles *Microselia*. Discovery of the female is likely to clarify the affinities of this genus.

Description

Frons with median furrow and 4-4-4 bristles but no supra-antennals. Eyes well developed and microscopically hairy. Three ocelli present. Palps short and without

---

Figs. 1–5. Posterior faces of parts of leg. 1: *Menozziola schmitzi* (Menozzi) hind tibia of male. 2–4: *Microselia southwoodi* Disney. 2: last two tarsal segments of front leg of female. 3: the same for male. 4: hind femur of male. 5: *Razorfemora nussbaumi* n. sp. hind femur and tibia of male. Scale bars = 0.1 mm.

Figs. 6–10. 6: *Phalacrotophora berolinensis* Schmitz abdominal tergite 3 of female. 7: *Megaselia (=Veruanus) oldenbergi* (Schmitz) right antenna of female. 8: *Razorfemora nussbaumi* n. sp. left antenna of male. 9: *Menozziola schmitzi* (Menozzi) ovipositor from below. 10: *Megaselia apophysata* Schmitz ovipositor from left side. Scale bars = 0.1 mm.

Figs. 11–13 Male hypopygia viewed from left side. 11: *Razorfemora nussbaumi* n. sp. 12: *Menozziola schmitzi* (Menozzi). 13: *M. obscuripes* (Schmitz). Scale bars = 0.1 mm.

Figs. 14–15. *Styletta ewadurskae* n. sp. male. 14: right wing. 15: hypopygium viewed from left side. Scale bars = 0.1 mm.

differentiated bristles. Third antennal segment longer than broad, and with a dorsal arista. Proboscis short and simple.

Thorax with mesopleuron divided and bare. Only two notopleural bristles.

Abdomen with tergites 2–6 well developed. Epandrium with postero-lateral corners extending rearwards. Hypandrium with posterior lobe of left side vestigial. Anal tube a little shorter than length of dorsal face of epandrium.

Fore metatarsus longer than any of the other tarsal segments. Both mid and hind tibia with a dorsal, longitudinal hair palisade. Hind femur slender, but with a triangular basal projection.

Vein 3 forked. Vein Sc present. Costa less than half wing length.

Razorfemora Nussbaumi sp. nov

Type locality, Israel, Petachtiqwa.

Type material, Holotype, male, Israel, Petachtiqwa, 1.x.86. Leg. Y. Nussbaum, in University Museum of Zoology, Cambridge, England.

Etymology. The species is named after the collector.

Diagnosis. Outermost pair of bristles on vertex greatly reduced. Postero-lateral extremity of left side of epandrium shorter and more sharply tapered than that on right side. Anal tube brownish. Haltere largely brown.

Description (male only)

Frons dark brown and clearly broader than high. Antero-lateral bristles about 1.5 × length of antials and at about the same level on frons (the left antial is totally missing in the holotype). Pre-ocellar bristles nearer median line than antials and much lower than medio-laterals. Inner bristles on vertex about as long as antero-laterals, but outer pair less than one-third this length. Palps short, broadening gradually to rounded apex, and with 10–12 differentiated hairs below. They are brown, but a little paler basally. Antennae as Fig. 8, brown and with brown arista.

Thorax brown, to almost black on top. Scutellum with four somewhat fine bristles, the anterior pair being a little shorter and finer than posterior pair.

Abdomen with brown tergites 1–6 and brownish grey venter. Tergites with scattered, short, hairs, which are a little longer behind. Hairs on segments 3–6 of venter. Hypopygium as Fig. 11 and brown to pale brown in places, especially postero-laterally on left side of epandrium. Anal tube brownish to paler above and below. Hypandrium with well developed lobe from right side, but not from left.

Legs brownish, with tarsi and parts of tibiae in particular more yellowish. Fore tarsus with metatarsus clearly longer than any of the other segments, and with a postero-dorsal hair palisade on segments 1–4 only. Fore tibia with hairs of dorsal face slightly differentiated from rest of hairs, but not sufficiently closely packed to form a true hair palisade. Middle tibia with a somewhat irregular dorsal hair palisade for about three-quarters of its length. The apical ventral spur is about 1.3 × as long as maximum breadth of mid tibia. Hind femur and tibia as Fig. 5.

Wings 1.83 mm long. Costal index 0.44. Costal ratios 2.94:0.70:1. Costal cilia 0.06–0.07 mm long. Costa gradually widens in outer half of section one and then gradually narrows again in section three. Subcosta reaches R1, but is otherwise obscure in outer half. Fork of vein 3 originates just beyond level of apex of vein 1. No hair at base of vein 3. Axillary ridge with two hair-like bristles. All veins greyish, the thin veins in particular being somewhat pale. Membrane lightly tinged greyish. Haltere largely brownish.

Styletta Borgmeier, 1960

Borgmeier (1961) provided an amplified description of the type species, *S. crocea* Borgmeier, which is only known in the female sex. This species has a bare mesopleuron, an unforked vein 3 which is subparallel to vein 2; a third antennal segment which is clearly longer than broad (in the female); and, apart from the four bristles on the vertex and the ocellar bristles, only a single pair of bristles on the frons below the ocelli. The latter were interpreted as the antials, but from their position they could equally well be supra-antennals. This point is not merely academic, as the presence or absence of supra-antennal bristles has been used in keys to genera (e.g. couplet 41, p. 88 in Schmitz, 1929).

Brown (1988) added a second species, *S. camponoti* Brown, to the genus. He compared his species with *S. crocea* and concluded they 'showed sufficient similarity . . . to consider them tentatively congeneric, although there are significant differences between them'. The latter include a full set of frontal bristles, including four supra-antennals and a spherical third antennal segment. He procured both males and females. The former has a hypopygium very similar to *Menozziola*.

The males of a new species from Poland closely resemble those of *S. camponoti*. If Brown is correct in assigning this species to *Styletta* then the species from Poland must be assigned to the same genus. It is described below.

Styletta ewardurskae sp. nov.

Type locality, Poland, Forest of Bialowieska.

Type material. Holotype, male, Poland, Forest of Bialowieska, undergrowth associated with ancient trees, 24.v–6.vi.86 Leg. Ewa Durska, in University Museum of Zoology, Cambridge, England. Paratypes, three males same data as holotype, except two deposited in the Institute of Zoology, Polish Academy of Sciences, Warsaw, Poland.

Etymology. The species is named after the collector.

Diagnosis. Frons with two supra-antennal bristles and 4–4–4 bristles above these. Third antennal segment subspherical, but slightly produced apically. The longest bristles on sides of male epandrium are as long, or longer, than bristles at apex of proctiger.

Description (male only)

Frons broader than high, with a strong median furrow, brown, and with 58–74 hairs. The two supra-antennal bristles a little closer together than pre-ocellars. Antials about midway between supra-antennals and antero-laterals. The three bristles each side are in a more or less straight line, with the antero-laterals distinctly higher on the frons than antials. Pre-ocellars closer together than either is to a medio-lateral, and the latter a little lower on frons. Third antennal segment subspherical, but slightly produced apically, and brown with a brownish, short-haired, dorsal arista. Palps yellowish with about six bristles at apex, the most apical being longest. One or two hairs below and a pair of irregular pits on the upper external face. Labrum pale, labella simple and generally pale.

Thorax brown to almost black on top. Notopleuron with two bristles. Mesopleuron bare. Scutellum with a posterior pair of bristles and an anterior pair of minute hairs.

Abdomen with brown tergites bearing a few minute hairs, mainly at rear margins. Venter yellow grey and bare. Hypopygium brownish, with a paler anal tube, and as Fig. 15.

Legs yellowish grey to pale brownish, the hind legs being darkest. Fore metatarsus longer than other tarsal segments. The fourth segment is shorter than fifth. Only the first four segments have a postero-dorsal hair palisade. Mid tibia with dorsal, longitudinal hair palisade extending nearly three-quarters of length. Apical spur longer than second tarsal segment. Hind tibia with a dorsal, longitudinal hair palisade. The postero-dorsal near middle is strongest, and those below it stronger than those above. Hairs below base of hind femur weaker than those of antero-ventral row in outer half.

Wings as Fig. 14. Length 1.17–1.26 mm. Costal index 0.29–0.33. Costal ratios 1.90–2.13:1. Costal cilia 0.07–0.09 mm. Axillary ridge with one or two small bristles. No hair at base of vein 3. All veins yellowish grey. Membrane slightly greyish. Haltere largely brownish.

Trophithauma Schmitz, 1925

This genus is readily recognized in the female sex (Schmitz, 1929, Gotô, 1984) but cannot be distinguished from *Megaselia* in the male sex. Whether it represents an aberrant clade within *Megaselia* or a truly distinct genus remains to be demonstrated.

Tubicera Schmitz, 1920

The female of this genus is still unknown. Borgmeier (1924) added a second species to the genus. However this seems to have been largely on the basis of its elongated third antennal segment. In many respects it differs from the type species, *T. lichwardti* Schmitz. Thus the latter has an arista, hairs on the mesopleuron and a *Megaselia*-type hypopygium. By contrast *T. fresmanni* Borgmeier has no arista, a bare mesopleuron and a somewhat peculiar hypopygium (see Fig. 6 in Borgmeier, 1928). The case for including these two species in the same genus has yet to be made. Procurement of the females of the two species will probably resolve the issue.

Veruanus Schmitz, 1927

The type species, *V. memorabilis*, is also described in Schmitz's (1929) monograph. It is essentially a *Megaselia* with an unforked vein 3, somewhat oval third antennal segments, a bare mesopleuron, four scutellar bristles and a long, narrow anal tube. Its female is not known. While the justification of a separate genus for this species remains to be demonstrated, it is at least a somewhat distinct species.

Schmitz (1919) described a species, known from a single female, under the name *Aphiochaeta oldenbergi*. The species has a forked vein 3, somewhat elongate third antennal segments (Fig. 7), a bare mesopleuron, four scutellar bristles and a modified ovipositor. The last character caused Schmitz (1929) to tentatively suggest this species should be transferred to *Apocephalus* Coquillett; rather than *Megaselia*, with which *Aphiochaeta* had been synonymized. Subsequently (Schmitz, 1940) it was transferred to *Veruanus*. By so doing the concept of *Veruanus* was modified. The unforked vein 3 ceased to be diagnostic and a modified ovipositor was added to the diagnosis. Because this species only differs from typical *Megaselia* by virtue of its modified ovipositor and somewhat atypical antennae it is keyed out as though it were a *Megaselia* by Schmitz and Delage (1981).

Since the synonymizing of *Plastophora* with *Megaselia* (Disney, 1986), the character of a modified ovipositor cannot be used without qualification. The different types of modification, in the adaptive radiation of ovipositors and antennae

in the Metopininae, need to be analysed before ovipositor or antennal character states can be used in classification. The case for regarding *V. oldenbergi* and *V. memorabilis* as belonging to the same genus cannot be sustained, unless both are regarded as deviant species of *Megaselia*. As it is not possible to distinguish *V. oldenbergi* from *Megaselia* in our present state of knowledge I return it to the latter genus thus:— *Megaselia oldenbergi* (Schmitz, 1919) **Comb. nov.**

Beyer (1965) added a third species, *V. capillifrons*, to the genus, on the basis of males only. It has a forked vein 3, somewhat elongated third antennal segments, a longish anal tube and only two scutellar bristles. In his generic keys he runs it to *Veruanus* on the basis of the disposition of the frontal bristles. However several European *Megaselia* species would run to *Veruanus* on this basis. Beyer gives no grounds for considering this species to be other than a somewhat distinctive species of *Megaselia*. I thus transfer it to the latter genus:— *Megaselia capillifrons* (Beyer, 1975) **Comb. nov**.

In the keys to Afrotropical *Megaselia* (Beyer, 1965) this species runs to couplet 5 on page 56.

Borgmeier (1971) added a fourth species, *Veruanus verus*, to the genus, on the basis of a single female. The unforked vein 3 and 'chitinized' ovipositor seem to be the principal reasons for the assignment to *Veruanus*. However the pointed third antennal segment with an apical arista represents a radical modification of the generic concept. Indeed, apart from the chitinization of the ovipositor, this species would seem closer to *Ceratoconus* Borgmeier. I propose to regard the generic placement of this species as being unresolved for the time being. Slide-mounted females need examination for evidence of Dufour's crop mechanism. Discovery of the males would be likely to resolve its affinities.

I conclude by noting that *Veruanus* should now be regarded as including only the single species, *V. memorabilis*. Slide-mounted females, for recording the presence or absence of Dufour's crop mechanism, and males are required, before the question of the validity of the genus *Veruanus* can be resolved.

Acknowledgements

I am grateful to Dr H. Ulrich (Zoologische Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany) for the loan of a specimen of *Megaselia apophysata* from the Schmitz Collection. Brian V. Brown kindly sent me a specimen of *Pseudacteon crawfordi*.

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SHORT COMMUNICATION

The oak bush cricket (*Meconema thalassinum* Deg.) in a Cheltenham garden.— Since 1979 I have regularly noted this species, mainly in August. In the garden there are several oaks, with others in the neighbourhood. Most of the insects, however, occurred on a pyracantha growing against the house, which they also occasionally entered. Dates of observation were: 23.viii.79 onwards, several insects on pyracantha; 15.viii.82, one female on pyracantha; 22.viii.83, male and female respectively seen in garden around this date; 31.viii.87, 31.vii.89, 9.viii.89, several insects of both sexes noted at or near pyracantha.—H. Heyworth, 20 Bournside Road, Cheltenham, Gloucestershire GL51 5AH.

THE BRITISH SPECIES OF *METZNERIA*, *PALTODORA*, *ISOPHRICTIS*, *APODIA*, *EULAMPROTES* AND *ARGOLAMPROTES* (LEPIDOPTERA: GELECHIIDAE)

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This is the second in a series of papers describing and illustrating the British Gelechiidae. The first (Sokoloff, 1985) covered the genera *Teleiodes* and *Teleiopsis* and dealt with some general aspects of the family, including a diagram of a gelechiid wing showing the positions of the fold, discal and plical spots, characters which are used in some of the descriptions below; with this paper we deal with the 14 species belonging to the genera *Metzneria*, *Paltodora*, *Isophrictis*, *Apodia*, *Eulamprotes*, and *Argolamprotes*.

Metzneria Zeller

The genus *Metzneria* comprises about 40 species distributed throughout the palaearctic region. Most are univoltine, and six occur within the British Isles, two reasonably commonly. All but one of the British species feed on the seeds of members of the Compositae, the exception being *Metzneria littorella* Dougl., the larva of which feeds on the seeds of *Plantago coronopus* L. (Plantaginaeceae).

Adults of *Metzneria* are not often encountered in the wild, and breeding is the best way of obtaining specimens. Seedheads or stems as appropriate should be collected from late autumn to early spring, and kept outside in net bags, protected from the worst of the elements.

Metzneria littorella (Dougl.) Fig. 1

Wingspan 9–14 mm. Ground colour of forewing greyish-white, sprinkled with fuscous scales; a blackish subcostal dot at one third; stigmata black, plical before first discal, preceded by a black dot, both placed on a longitudinal ochreous-yellow streak; first and second discal spots placed in a similar streak; terminal black dots, rather obscure. Hindwings greyish-white.

Moth flies in May and June. Known only from the Isle of Wight (Ventnor), but could possibly occur on mainland Britain.

Larva almost apodal, yellowish-white; head blackish; prothoracic plate brown, bisected. Feeding on the seeds of buck's-horn plantain (*Plantago coronopus* L.) September to March. Pupates in the stem just underneath the seedhead.

Metzneria lappella (L.) (*silacea* sensu Haw.) Fig. 2

Wingspan 16–20 mm. Ground colour of forewing pale ochreous variously streaked or suffused brown; lines of greyish-brown scales tending to follow veins, sometimes obsolete. Stigmata blackish, first discal occasionally obsolete; Hindwings grey.

Moth flies June to July. Widely distributed and often common in south-east England in a line from south Devon to Cambridgeshire, with a second band of distribution stretching from Clwyd across to Humberside, and north to Northumberland. Recorded in Scotland only from Kincardineshire. Not recorded from Ireland. Probably overlooked elsewhere.

Larva whitish; head dark fuscous. Feeding on the seeds of greater burdock (*Arctium lappa* L.) September to April. Pupates in the seedhead.

PLATE II. Sokoloff and Bradford. 1990

1. M. liltorella

2. M. lappella

3. M. aestivella

4. M. metzneriella

5. M. neuropterella

6. M. aprilella

7. P. cytisella

8. P. cytisella

9. I. striatella

10. A. bifractella

11. E. atrella

12. E. phaeella

13. E. unicolorella

14. E. wilkella

15. E. wilkella

16. A. micella

Metzneria aestivella Zell. (*carlinella* staint.) Fig. 3

Wingspan 13–16 mm. Ground colour of forewing pale-ochreous to ochreous, more or less wholly suffused reddish-ochreous; margins and veins partly marked with greyish-fuscous lines. Hingwings grey.

Moth flies June to July. Widely distributed in the southern counties of England from Cornwall through to Essex. Isolated records from elsewhere, especially northwest Wales. Nottingham and north to Northumberland. Not yet recorded from Scotland or Ireland.

Larva whitish; head and prothoracic plate blackish. Feeding on the seeds of carline thistle (*Carlina vulgaris* L.) October to April. A few raised florets often indicate the presence of a larva. Pupates in the seedhead.

Metzneria metzneriella (Staint.) Fig. 4

Wingspan 14–19 mm. Ground colour of forewing pale ochreous-yellow, reddish-ochreous streaks towards costa; margins and veins more or less suffused grey, sprinkled fuscous; stigmata black, first discal much beyond plical. Hindwings grey.

Moth flies June to August. The commonest and most widely distributed of our *Metzneria* species, recorded from most parts of England, north and west Wales, Scotland as far north as Fifeshire and Dunbartonshire. In Ireland recorded from Co. Clare, south-east Galway and Dublin.

Larva whitish-yellow, head and prothoracic plate dark fuscous. Feeding on the seeds of common knapweed (*Centaurea nigra* L.), or, less commonly, saw-wort (*Serratula tinctoria* L.) October to April. Pupates in the seedhead.

Metzneria neuropterella (Zell.) Fig. 5

Wingspan 14–24 mm. Specimens can vary greatly in size. Ground colour of forewing pale ochreous, reddish-ochreous along costa and towards apex; veins marked with dark grey-brown lines, terminally suffused; indistinct spots on costa at base, beyond middle and apex, and an oblique, sometimes interrupted bar from costa before middle. Hindwings grey.

Moth flies June to August. Local and uncommon, in all probability overlooked. Known from Kent, Hampshire, Dorset, East Sussex, Surrey, Bedfordshire, Cambridgeshire and Middlesex. Westmorland is the only northern record.

Larva dull yellowish; head brown. Feeding on seeds of knapweed (*Centaurea nigra* L.) October to May. Pupates in the seedhead.

Metzneria aprilella (H.-S.) Fig. 6

Wingspan 15–18 mm. Ground colour of forewing grey-brown; yellowish streaks at base and occasionally at two-thirds and beyond; veins and fold marked with reddish-vermillion; reddish-vermillion streaks along costa. Hindwings darkish grey.

Moth flies May to August. This striking insect was first recognized as British in 1981 (Sattler, 1981), and a number of specimens have been found in collections misidentified as *M. neuropterella*. As a recently recognized British species, the distribution picture is far from complete, but records so far indicate the species is widespread in suitable habitats, mainly in central-southern and eastern England. There are isolated records as far north as Northumberland. The first British specimens were bred in July 1971 from seedheads of *Centaurea scabiosa* L. collected in the autumn of 1970 at Chilbolton, Hampshire, by E.C. Pelham-Clinton and D.W.H. Ffennell.

Larva not described but feeding on the seeds of greater knapweed (*Centaurea scabiosa* L.) September to March. Pupates in the seedhead.

Paltodora Meyrick

The genus *Paltodora* is monotypic.

Paltodora cytisella (Curt.) Figs 7 and 8

Wingspan 10–12 mm. Two colour forms are illustrated. Forewing ochreous-yellow suffused fuscous towards costa, or wholly suffused rather dark fuscous; an oblique whitish line from two thirds and sometimes an outwards-oblique whitish tornal mark, often obsolete in dark specimens; several faint pale dashes in costal cilia sometimes visible. Hindwings dark grey.

Moth flies July to August. Widespread, particularly in southern and eastern England and north Wales, ranging northwards to Cumbria. In Ireland it has been recorded from Wicklow, Wexford and North Kerry. Not recorded from Scotland. Comes readily to light.

Larva dark red; head fuscous; prothoracic plate blackish-brown; spiracles white. Feeding May and June in the stems of bracken (*Pteridium aquilinum* L.), causing a slight swelling. Aborted side-shoots may also indicate the presence of a larva. Pupates in the stem. To rear this species, stems should be collected as near to emergence time as possible as cut stems rot quickly, killing the pupa.

Isophrictis Meyrick

The genus *Isophrictis* is of European and North American distribution. The larvae feed on the stems or seedheads of members of the Compositae. Of the 20 or more species, only one occurs in Britain.

Isophrictis striatella (D.&.S.) (*tanacetella* Schr.) Fig. 9

Wingspan 11–13 mm. Ground colour of forewing dark brown; termen squarish; an indistinct ochreous-white longitudinal line and another along fold interrupted on anterior stigmata; second discal stigma black; a fine white oblique line from four-fifths of costa to termen; black scaling at apex and three black lines with some white dashes in cilia. Hindwings dark grey.

Moth flies July to August. Although recorded from the east of South Devon, occurs mainly in south-east England in a line from Hampshire to Cambridgeshire. In the north known from Gwynedd in Wales and Aberdeenshire in Scotland. No doubt overlooked elsewhere.

Larva yellowish; head black; prothoracic plate bisected, light grey. Feeding on the seeds of tansy (*Tanacetum vulgare* L.) or sneezewort (*Achillea ptarmica* L.) November to April. Pupates in a dead stem. Small holes in the stem often indicate the presence of a pupa.

Apodia Heinemann

The genus *Apodia* contains two European species, one of which occurs in Great Britain.

Apodia bifractella (Dup.) Fig. 10

Wingspan 9–12 mm. Head and palpi orange. Ground colour of forewing dark fuscous, sprinkled whitish-grey scales, dorsally more or less mixed ferruginous-orange; a more distinct tornal orange mark; an ochreous-white or pale orange costal spot beyond it, sometimes finely connected. Forewing markings in some specimens obscure or hardly discernable. Hindwings dark grey.

Moth flies July to August. Widely distributed in southern England and Wales where foodplant occurs. Also in north Wales. Rests on the flowers of the foodplant in the afternoon and evening.

Larva almost apodal, stout and whitish; head yellow-brown. Feeding on the seeds of common fleabane (*Pulicaria dysenterica* L), ploughman's spikenard (*Inula conyza* DC.) or sea-aster (*Aster tripolium* L.) October to April. Pupates in the seedhead.

Eulamprotes Bradley

The genus *Eulamprotes* contains seven European species, four of which occur in the British Isles. To date the foodplants of only two of our species are known.

Eulamprotes atrella (D. & S.) Fig. 11

Wingspan 11–13 mm. Ground colour of forewing dark purplish-fuscous; a triangular yellow-ochreous tornal spot, another on costa beyond it; some faint yellow-ochreous dashes in apex of wings, often obscure or missing. Hindwings grey. Moth flies July to August. Widely distributed in England and Wales as far north as Cumbria. Known also from the borders region in Scotland, and Co. Clare in Ireland.

Larva pale whitish-green, head light brown; prothoracic plate grey posteriorly, with two black spots or flecked black anteriorly. Feeding in the stem, or shoot mining down into the stem, of St Johns wort, normally *Hypericum perforatum* L. or *H. hirsutum* L., during May. Pupates in a flat case formed from a portion of the mined stem, or sometimes more commonly, a leaf.

Eulamprotes phaeella Heckford & Langmaid. Fig. 12

Wingspan 8–13 mm. Ground colour of forewing dark fuscous, a small yellowish-white costal spot at two-thirds interfusing with the cilia, sometimes a few yellowish-white scales at tornus; stigmata usually obsolete, but where present are darker than ground colour; cilia from costal spot to apex dark fuscous, paler from apex to tornus; hindwings light fuscous, cilia concolorous, paler towards anal angle.

Moth flies June to September. A recently recognized species (Heckford and Langmaid, 1988) whose distribution is poorly known. Records to date indicate the species could be western and northern with confirmed records from Cornwall, Devon the Gower, Glamorgan and northern Scotland, from Perthshire to Sutherland; in Ireland recorded from the Burren, Co. Clare and south-east Galway.

Larva and foodplant unknown.

Eulamprotes unicolorella (Dup.) Fig. 13

Wingspan 10–13 mm. Colour of forewings unicolorous dark, shiny purplish-bronzy-fuscous. Hindwings grey.

Moth late May to July. Local but widely distributed in England, Wales and Scotland as far north as Argyll. In Ireland it is recorded from Co. Clare and Fermanagh.

Larva and foodplant unknown.

Eulamprotes wilkella (L.) (*pictella* (Zell.) Figs 14 and 15

Wingspan 8–10 mm. Two forms of this species are illustrated. Ground colour of forewing blackish-fuscous; at certain angles to the light a faint violet tinge is discernable; two silvery bars from costa at a quarter and a half, reaching the fold; an oblique fascia at three-quarters, sometimes interrupted or obsolete; silvery-white spots in cilia and at apex. Hindwings pale grey.

Moth bivoltine flying in June and again in August. Widely but sporadically distributed, mainly in sandy places of coastal counties of England, Wales and eastern Scotland as far north as Kincardineshire.

Larva pale rose, head pale brown, prothoracic plate brownish. Feeding from a silken tube just below the surface of the ground on common mouse-ear (*Cerastium fontanum* Baumg.). Pupates in a silken cocoon just below the surface of the ground.

Argolamprotes Benander

The genus *Argolamprotes* contains only one species resident in Great Britain.

Argolamprotes micella (D. & S.) Fig. 16

Wingspan 12–14 mm. Ground colour of forewing dark brassy-brown with purple or violet iridescence; oblique fascia from costa at one-sixth to beyond fold, interrupted on fold; plical spot on fold, several spots in a longitudinal line in disc, scattered subcostal scaling above disc with tornal and costal spots beyond; several teminal spots, all silvery blue. Hindwings dark grey.

Moth flies in July. First recorded in Great Britain in 1963 (Kennard, 1965) and only known from East Cornwall, South Devon and Hampshire; appears to be spreading eastwards.

Larva (after Eckstein, 1933) bright yellowish-grey, striped reddish; head, neck and claspers blackish. June. Larva unknown in this country; possibly feeds in the pith of a stem of raspberry (*Rubus idaeus* L.), but moth has been found amongst bramble, where no raspberry grows.

Acknowledgement

We would like to thank D.J.L. Agassiz and R.J. Heckford for their many helpful comments on the text, and to R.J. Heckford for the loan of the specimen of *Eulamprotes phaeella* figured here.

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OBITUARY

Stanley Norman Aflalo Jacobs 1896–1989

Stanley Jacobs died on 14th September 1989, aged 92 years. Educated at St Dunstan's College, he pursued a wide range of professional activities beginning as an engineering apprentice before enlisting in the army, and serving in France during the First World War. After the war he turned his attention to agriculture, both in Canada and the UK working, amongst other things, in poultry farming and with stored product pests. Eventually he joined the family shipbroking business, where he remained until his retirement.

He worked for many years before and after retirement on curatorial duties at the British Museum (Natural History), and was editor of the *Entomologist's Record and Journal of Variation* for 17 years between 1955 and 1973.

His association with this Society goes back over 60 years, and his influence on our development has been profound. The story starts in 1923 when he was returning home after a week's work in the country. As was usual when travelling, his net was tied to the top of his suitcase; this net was spotted by an entomologist, a Mr S. Abbot, who accosted him on London Bridge Station and persuaded him to apply for membership of the South London Entomological and Natural History Society. This he did, and was elected to membership on 28th June 1923, a year when Captain N.D. Riley was President; membership stood at a (then) record of 225 and trouble stalked the Society in the form of the landlord doubling the rent on the meetings rooms at the Hibernia Chambers. To meet this increase of £25 per year, annual subscriptions had to be raised to two shillings and six pence.

He first exhibited at an indoor meeting on 24th January 1924, showing '. . . a remarkably pale specimen of *Hybernia defoliaria* in which all marking was practically suppressed . . .'; he attended meetings regularly and joined the Council of the Society in 1930, and in 1931 was appointed 'assistant to Stanley Edwards', succeeding him in 1932 to become Honorary Secretary jointly with H.J. Turner. In 1935 the role of Secretary was split, with Turner becoming 'Reporting Secretary' and Jacobs taking the job of 'Corresponding Secretary', a position he held until 1940 when his increasing work for the Police Force during the war years forced him to resign. During this period he published a number of papers in the *Proceedings and Transactions* including '*Aphomia gularis*', and 'The Microlepidoptera' in 1936, and translations of key papers by J. Klimesch on *Nepticula* (1936) and *Bucculatrix* (1938).

It was during the early war years that Jacobs, together with Captain F. Stanley-Smith, conceived the project that members of the Society specializing in the Microlepidoptera should produce a series of papers on identification which might eventually be brought together into a book — a venture which took nearly 40 years to reach fruition in the *Illustrated papers on British Microlepidoptera* published by the Society in 1978. Jacobs himself produced the first paper in the series with 'On the British species of the genus *Lithocolletis* Hb.' which was read to the Society on 9th July 1942. He based the paper on an earlier work by Le Marchand, illustrating the text with both line drawings of wing patterns and a colour plate based on his own paintings.

His talent as an amateur painter was used to the full during the *Illustrated papers* project, in which he painted nine out of the twelve plates published between 1944 and 1957. Of these he also wrote the text for five of them: in addition to the *Lithocolletis* paper, these were 'The British Lamproniidae and Adelidae' (1947); 'The British Oecophoridae (Part I) and allied genera' (1948); 'The British Oecophoridae (Part II)' (1949) and 'On the British Oecophoridae III' (1953). The other illustrations were for

Fig. 1. S.N.A. Jacobs 1896–1989. Photograph taken at the BM(NH) in 1983.

Wakely's 'Notes on the genus *Mompha*' (1944) and Ford's three papers 'The Psychidae' (1945), 'The Plutellidae' (1949) and 'The Glyphipterygidae and allied families' (1952).

Jacobs was elected President of the Society in 1944; his Presidential address was on 'Some recent imported insects', but he also took the opportunity to publish his *Lithocolletis* paper, read two years earlier. After serving on Council in 1946 and 1947, he joined the library committee in 1947, and was an assistant editor to the *Proceedings* between 1948 and 1950. By 1946 Jacobs, together with Wakely and a number of others were working on a major project on the Microlepidoptera, under the direction of L.T. Ford, which resulted in the issue, in 1949, of the Society's first

major publication, '*A guide to the smaller British Lepidoptera*'. This work, together with the supplement published in 1958 remained the microlepidopterist's *vade mecum* for 30 years until the publication of its successor, A.M. Emmet's '*A field guide to the smaller British Lepidoptera*', published in 1979, — to which Jacobs contributed both practically and financially.

He became President for a second time in 1954 when he took the opportunity to read his third illustrated paper on the British Oecophoridae. He was elected an honorary life member in 1967. Throughout his association with the Society he was a regular exhibitor and contributor to indoor meetings, and made many donations to the library and collections. He attended meetings well into his 80s, and the annual exhibition in his 90s!

I would like to conclude this brief memoir with a personal recollection. I first met Stanley in 1971, and will always remember the generosity of his advice, his company and wry sense of humour. He was fiercely independant and I recall many hair-raising trips through the London rush-hour, with Stanley at the wheel, to attend BENHS meetings. He was very disappointed when his doctor banned him from driving in 1979 but his resignation to house-bound immobility did not last very long. Feeling that 82 was really too young to, as he put it, 'prepare for pupation' he decided that two legs would be a reasonable substitute for four wheels, and continued to attend Society meetings and exhibitions for many further years. One incident reminds me of his determination: we were travelling to London by train for a BENHS meeting at around the time of his 85th birthday. The train broke down, and we were forced to walk down the track to Brixton station, a ten minute hobble in total darkness and cold drizzle. At the end of this I, some half a century his junior, was ready to pack up and go home. Stanley was not. He won.

PAUL SOKOLOFF

SHORT COMMUNICATION

***Agrilus sinuatus* (Olivier) (Coleoptera:Buprestidae) widespread in Gloucestershire, and at a Herefordshire locality.** — Ian Carter (1986) added *Agrilus sinuatus* to the Gloucestershire list on the basis of specimens beaten from hawthorns on Leckhampton Hill, 29.vii.1985. Later in the same year he found the species at North Cerney and Whitcliff Park, Berkeley (Carter, pers.comm.). I examined the characteristic larval borings (see Figure 1) at the North Cerney site (SP 018088) — an area of unimproved limestone pasture with scattered old hawthorns — with him on 12.vi.1988. I have subsequently been examining dead hawthorn trunks widely in the county and have produced the following new records. Ravenswell Banks, Withington (SP 037164), 11.ix.1988, borings in dead hawthorn of old hedgerow above scrubby limestone pasture banks; Hornsleasow Roughs (SP 117326), 18.ix.1988, borings in old hedgerow hawthorn by expanse of rough unimproved pasture with frequent old hawthorns; Hick's Down, River Leach (SP 179077), 14.i.1989, borings in dead hawthorn within scrubby pasture; Cirencester Park (SO 995017), 11.ii.1989, borings in dead hawthorn in former hedgeline within permanent pasture; Woodbridge Banks, Withington (SP 046148), 9.iv.1989, borings in old hedge hawthorn; Sandhurst Nature Reserve (SO 817231), 20.viii.1989, very fresh

borings in dead hawthorn of old hedge; Charlton Abbots Estate, Winchcombe, 1.x.1989, borings in dead streamside hawthorns (SP 029252) and in dead hawthorn within scrubby pasture (SP 036249).

It is clearly widespread in the county, at least east of the River Severn. It is not however ubiquitous in old hawthorns — many sites visited showed no signs of activity. A visit to Eastnor Deer Park, near Ledbury in Herefordshire (SO 751382), 18.iii.1989, found further borings in old hawthorns in this area of ancient pasture woodland.

My thanks to Dave Clements for the illustration (Figure 1). — Keith N. A. Alexander, 22 Cecily Hill, Cirencester, Glos. GL7 2EF.

Reference

Carter, I. 1986. Some rare and interesting beetles new to Gloucestershire. 1985 Annual Exhibition. *Proc. Trans. Br. Ent. Nat. Hist. Soc.* **19**: 50.

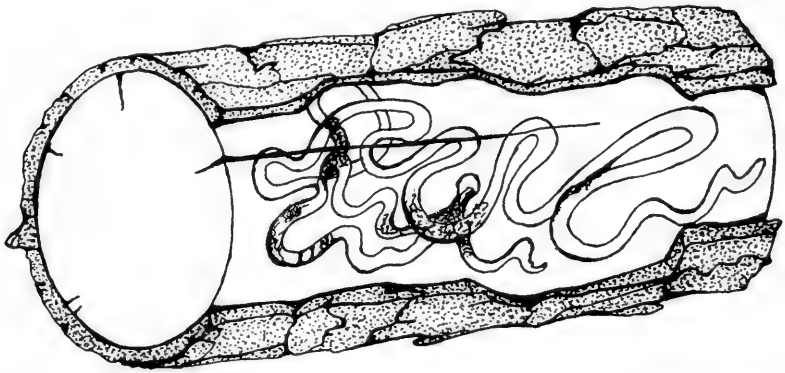

Fig. 1. Section of dead hawthorn trunk with bark partially stripped away to reveal characteristic borings of *Agrilus sinuatus*. Scale 1: 4.

***Agrilus angustulus* (Illiger) (Coleoptera: Buprestidae) new to Gloucestershire.** — A single *Agrilus angustulus* was found on a leaf of *Hypericum perforatum* L. growing by a ride in the oak–ash–hazel woodland of Hailey Wood in Gloucestershire (SO 955010), 30.vi.1985. This wood forms part of the important Cirencester Park Estate woodlands, and the record is the first of this species for the county — it is not included in Atty (1983). — Keith N. A. Alexander, 22 Cecily Hill, Cirencester, Glos. GL7 2EF.

Reference

Atty, D.B. 1983. *Coleoptera of Gloucestershire*. Published Privately, Cheltenham.

ANNOUNCEMENT

The Professor Hering Memorial Research Fund

The British Entomological and Natural History Society announces that awards may be made from this Fund for the promotion of entomological research with particular emphasis on:

(a) Leaf-miners
(b) Diptera, particularly Tephritidae and Agromyzidae
(c) Lepidoptera, particularly Microlepidoptera
(d) General entomology

in the above order of preference having regard to the suitability of candidates and the plan of work proposed.

Awards may be made to assist travelling and other expenses necessary to fieldwork, for the study of collections, for attendance at conferences, or, exceptionally, for the costs of publication of finished work. In total they are unlikely to exceed £600 in 1990/91.

Applicants should send a statement, if possible in sextuple, of their qualifications, of their plan of work, and of the precise objects and amount for which an award is sought, to Dr M.J. Scoble, Department of Entomology, The Natural History Museum, Cromwell Road, London SW7 5BD, as soon as possible and not later than 30 September 1990.

BRITISH JOURNAL OF ENTOMOLOGY AND NATURAL HISTORY

Volume 3, Part 1, April 1990

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Line and continuous tone figures are accepted. Writing on figures is best listed separately for setting and its placing indicated on a duplicate figure. Seek advice before drawing. Reduction may otherwise necessitate redrawing.

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are held regularly and the well-known ANNUAL EXHIBITION and ANNUAL DINNER are planned for the 27th October 1990 at Imperial College, London SW7.

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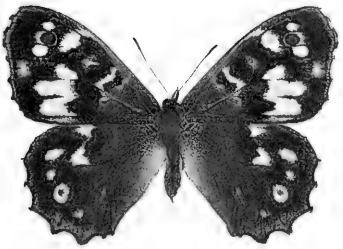

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IMPORTANT ANNOUNCEMENT

At the end of 1989 the Society vacated its rooms in the Alpine Club. Until the Society moves into new premises, the library and collections will be put into storage. Indoor meetings will be held at the Royal Entomological Society, 41 Queen's Gate, London SW7 on the second and fourth Wednesdays of each month. **The Journal will continue to be published as normal.** Without a permanent address, it is important that members have clear and easy communication with the various officers to ensure the continued smooth running of the Society. The following is a list of useful addresses.

Subscriptions and changes of address to the Assistant Treasurer: G. N. Burton, Mar-y-Mar, Minister Drive, Minister-in-Sheppey, Kent ME12 2NG.

Applications for membership to the Membership Secretary: A. Godfrey, 10 Moorlea Drive, Baildon, Shipley, W. Yorks, BD17 6QL.

Non-arrival of the Journal, faulty copies or other problems arising from distribution of the Journal or notices to the **Distribution Secretary:** D. Young, 32 Valley Road, Burghfield Common, Reading, Berks RG7 3NF.

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THE 1988 PRESIDENTIAL ADDRESS — PART 1 REPORT

I.F.G. McLean
Nature Conservancy Council, Northminster House, Peterborough PE1 1UA.

This has been an eventful year in the history of the Society, and I have been conscious throughout of the efficient and hard-working efforts of the officers and members of Council in ensuring the smooth running of the Society's affairs. It is their diligence which enables the membership as a whole to enjoy participating in the activities of the Society and to make use of the facilities at 74 South Audley Street.

In March 1988 the Society took the major step of deciding to donate £1000 of the interest from the Hammond fund to the RSPB Abernethy Forest appeal. This donation seems particularly appropriate for a number of reasons. Firstly, the area is renowned as one of the finest remaining Caledonian pine woods, with an exceptional complement of the specialized insect fauna characteristic of this habitat, including a number of Red Data Book species. Secondly, the Society has been seeking to develop closer links with conservation bodies in Britain, and the efforts being made by RSPB to conserve habitats, including special measures to sustain threatened insect species on their reserves, deserve our fullest support. Thirdly, Cyril Hammond had a great fondness for the Spey valley and its insects and other wildlife, so it seems particularly appropriate that some of the interest from his bequest to the Society should be used in this way, and thereby help protect one of the finest insect localities in Scotland. Subsequently, in February 1989, the President attended on behalf of the Society a meeting convened in Edinburgh by the RSPB to discuss future management of the new reserve. The opportunity was taken to raise a number of points concerning both proposed management practices which would affect the invertebrate fauna, and also to discuss potential future recording and monitoring of the invertebrate fauna of the reserve. We look forward to closer involvement with RSPB in future, on this and other issues.

In December 1988 news was received that the Society would have to vacate the premises at 74 South Audley Street, at the latest by 31 December 1989. Subsequent discussions with the Alpine Club have shown that it is unlikely, though not impossible, that the two societies will share London accommodation in future. Clearly there is going to be a difficult period ahead for the Society until the accommodation problem is resolved, though it would be unduly pessimistic to regard the development as being entirely bad for the membership. It may well be that new premises, probably within central London, or possibly outside London, will give us the opportunity to develop the activities of the Society in new ways. There remains the need to attract more of the new generation of entomologists, who contribute to the many national invertebrate recording schemes, to join the ranks of our members. Therefore, at a time of change it seems wise to be alert to any chance of increasing the size of the membership and further developing the activities of the Society.

It is a sign of the times that the support of the Society has been sought on conservation issues, affecting important insect localities, on several occasions through the year. The President has informed the Council, and members attending ordinary meetings, of some current developments in nature conservation in Great Britain, and he has been heartened to receive support, encouragement and information in return. As always there have been successes and failures in site safeguard and management, affecting localities of interest to entomologists. However, it is noteworthy that there is increasing involvement in these issues from a wide section of the membership, and these contributions have significantly strengthened the conservation case on several occasions.

You have heard the officers' reports [published in Vol. 2, Part, 3, pp. 150–156], so I will not review their topics again, other than to say how grateful I am to them for making my duties as President so straightforward. There is an excellent team spirit at the heart of this Society, which is manifested more widely in the friendly and welcoming attitude towards new members and those new to our meetings. Long may we continue in this way.

Finally, it is my sad duty to report the deaths of four members during the year.

Mr A.L. WRIGHTSON joined the Society in 1954 and died on 16 April 1988. Latterly he resided at Burnley, Lancashire, and he formed an extensive Lepidoptera collection, initially from the South and Midlands, and latterly from East Lancashire.

Mr G.R. HOUGHTON from Oxford was a leading orthopaedic surgeon who was interested in butterflies on a world basis. His tragic death on 18 September 1988, after being knocked from his bicycle by a car, cut short the life of an enthusiastic and energetic entomologist.

Mr A. VALETTA lived in Malta and joined the Society in 1978. He died on 12 December 1988, having published extensively on the Lepidoptera of the Maltese islands, on which he had accumulated detailed information.

The TENTH DUKE OF NEWCASTLE was more widely known among members of this Society as Mr E.C. PELHAM-CLINTON, having only succeeded to the title on 4 November 1988 following the death of his cousin. He was a long-standing member of the Society, having joined in 1940, and he made distinguished contributions to several fields of entomology, most notably the Microlepidoptera. He died on 25 December 1988, and an obituary will be published in the Society's journal.

As we have previously stood in memory of these members and fellow entomologists on the announcement of their passing, I will not ask you to do so again.

I would like to conclude by recording my gratitude to this Society for the great honour of being asked to be your President, to the officers and members of Council for all their help over the past year, and to all the members who participate in the activities of the Society. Thank you all very much for a thoroughly enjoyable year.

THE 1988 PRESIDENTIAL ADDRESS — PART 2
WHAT FUTURE FOR OUR ENTOMOLOGICAL HERITAGE?

I.F.G. McLean
Nature Conservancy Council, Northminster House, Peterborough PE1 1UA.

The themes of this address are to review some aspects of our current knowledge of invertebrate conservation, to consider the prospects for invertebrates and entomologists in Britain, and to examine how the activities of this Society and its members may contribute to the challenging task of handing down a rich and diverse fauna to future generations of entomologists.

This address is prepared from the viewpoint of one who enjoys recreational entomology as a spare time activity, but who is also privileged to be employed as an entomologist by the Nature Conservancy Council (NCC), having the responsibility for developing a national strategy for invertebrate conservation. Thus much of what is discussed here concerns what might broadly be termed 'conservation' issues, but I will attempt to lighten this rather serious-sounding topic by approaching the task from the perspective of someone who wishes to see entomological activities bring pleasure to entomologists, and indeed become more popular among naturalists in general. On the threshold of a new decade, and indeed approaching a new century and millenium, is an opportune time to consider what the future may hold in store for this Society, and for entomologists generally. The value of looking forward in this way lies in helping us to decide what we should do next to benefit our Society and the wildlife we study.

The current state of invertebrate conservation

Since Alan Stubbs spoke on 'Conservation and the future for the field entomologist' in his presidential address to this Society for 1982, invertebrate conservation has continued to develop in Britain. News of some NCC projects has been summarized in exhibits displayed at the Annual Exhibition of the Society in recent years. Many significant sites for invertebrates have been identified through the valued contributions of entomologists to the Invertebrate Site Register, and the location of many threatened species is now better known. Good progress has been made in identifying some basic principles for tackling invertebrate conservation. The wider dissemination of these principles through workshops and seminars for conservationists in the NCC, in the county trusts and in other conservation organizations has been a central activity for my colleagues and me. the more people who understand how to tackle invertebrate conservation at a basic level — even if they do not study the animals themselves — the greater the probability that the needs of invertebrates will be more widely incorporated in conservation plans and tasks. This will improve the prospects for many important invertebrate sites, including sites of special scientific interest (SSSIs), national nature reserves and county trust reserves. There are new opportunities arising outside conservation sites as well, for example, through changes in agricultural policies. However, if land taken out of agricultural production is to benefit more than common and widespread invertebrates, the habitat needs of the more demanding species must be sustained.

At present, the rate of loss of semi-natural habitat due to agricultural activities has probably eased slightly, particularly in southern England. In many cases this is because there is relatively little land left where agricultural improvement is economically viable under the present system of agricultural grants. However, personal observations in northern and western Britain indicate significant changes in agricultural land use are still underway in these areas. In contrast, within south-east

England increased economic activity is resulting in many development proposals being put forward which will affect areas of high wildlife value, including SSSIs. Similar developments are increasing in other regions.

Following the start of Channel tunnel construction there is now a tremendous impetus for developing transport links, housing and industry within Kent. This is resulting in considerable pressure to develop many important sites for insects and other invertebrates in a part of Britain which has a rich fauna, including many rare and threatened species. These problems will remain as long as intensive economic development is concentrated within this relatively small area. Even Dungeness, an internationally important site, is under threat from a variety of proposals, including the demand to extract more shingle to supply aggregate for the construction industry. As an example of the work this creates for the regional staff of NCC, in Kent during 1988 there were 383 formal consultations over proposals affecting SSSIs and 190 affecting the wider countryside. For the south-east region as a whole there were 1221 SSSI and 467 wider countryside consultations, the workload for Surrey and Sussex being similar to Kent. The figures for south and south-west England regions are almost as high.

It is interesting that the numbers of naturalists who are members of societies for those studying insects, plants and birds are roughly inversely proportional to the numbers of species in these groups (Fig. 1). Despite this imbalance, the conservation needs of insects and other invertebrates are becoming better known. This is a time of great activity in invertebrate conservation, and there are many opportunities to achieve more, as well as obstacles to overcome.

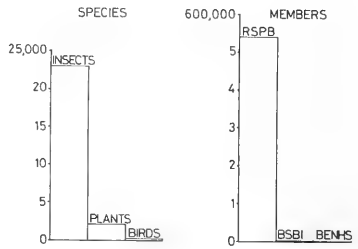

Fig. 1. The number of Britain's resident insects, higher plants and breeding birds, and the membership of the Royal Society for the Protection of Birds, the Botanical Society of the British Isles, and the British Entomological and Natural History Society.

Legislation and collecting

I will not review this topic in depth, but instead briefly state my personal opinions on this contentious subject. I share the views of the majority of entomologists that habitat protection and management is the area where legislation has the most to offer invertebrate conservation. This is in contrast to the situation for many vertebrates, where species protection is important for preventing damaging persecution by man. In my view species protection legislation (as applied to those species listed on Schedule 5 of the Wildlife and Countryside Act, 1981) should be confined to the small number of species where collection of even a few individuals could adversely affect the remaining populations. For these cases legal protection is entirely appropriate and necessary. In practice that is now the position in Britain, though there will always be disagreements about the wisdom of scheduling particular threatened species. Rather than dwell on the details here, it seems more profitable to look at what is happening elsewhere, and to try to anticipate what may happen in Britain over the next few years.

European legislation has been reviewed in detail by Collins (1987). In many other

European countries, species protection legislation has been seen as the primary legislative tool for developing insect conservation. However, without effective action on the ground, by themselves such measures have negligible positive effect. Indeed, species protection legislation which does not safeguard the critical habitat of threatened invertebrates, or develop action plans for their conservation, can be counter-productive. The harm arising from lengthy protective lists lies, firstly, in the bureaucracy necessary to administer them, which takes resources away from more productive conservation tasks. Secondly, if licences are required for the studies necessary to gain understanding of how to conserve these animals, then some entomologists will be deterred from involvement with conservation initiatives. Thirdly, such legislation can give the false impression that the field entomologist is not to be trusted, and that his activities are mainly responsible for causing declines of invertebrate populations. What follows from this is an alienation of the entomological community from those working in conservation. This is at a time when greater co-operation is needed between entomologists and conservationists if rare and threatened European invertebrates are to be saved from further declines and extinctions.

Naturally, it is incumbent upon entomologists to behave responsibly when collecting or studying threatened species. The activities of some commercial collectors, and a minority seeking to finance their entomological excursions through the sale of 'surplus' material, have catalysed the growth of inappropriate species protection legislation in parts of Europe. Looking forward on this issue in Britain, it is my aim to pursue a strategy of retaining a small list of invertebrates given full protection under Schedule 5, and to oppose the wider listings urged by some conservationists. At the same time it is essential to develop here further special measures to conserve threatened species, both those on Schedule 5 and others given Red Data Book status. In future, conservation bodies need to devote more effort and resources to research on habitat needs, to site protection and management. Also, greater consistency is required in the monitoring of threatened species populations, to assess the success of action taken.

The role of responsible collecting in enabling entomological studies to progress needs to be stated clearly, and I would like to take this opportunity to say that from inside NCC I will continue to support the case for sensible entomological collecting within the framework of the JCCBI 'A code for insect collecting' (1972). Taking specimens is necessary to further advance our understanding of the taxonomy, status and distribution of the many small and sometimes enigmatic species which cannot be reliably identified in the field. There are many undescribed species still awaiting discovery in Britain — a rich field for the inquisitive naturalist. Even where currently we believe we can identify to species level in the field, a new and closer look (with more detailed examination of structural features, or using techniques such as enzyme of chromosome analysis) frequently reveals additional cryptic taxa which have their own distinctive ecological and behavioural properties. In future the need for entomological studies, with the integral role played by field sampling and collecting, must be more widely promulgated among conservationists and the general public, otherwise the growth of protectionist attitudes will threaten the continued existence of field entomology as we know it today. At a time when collecting many other types of wildlife is widely regarded as unacceptable, the rational case for responsible collection of invertebrates must be argued. After all, if important wildlife sites are to be better documented and understood, then the recording and monitoring of invertebrates must be encouraged rather than hindered.

For the butterflies and dragonflies, most recording for studies of status and

distribution does not depend upon the retention of voucher specimens. However, even for these groups it may sometimes be necessary to keep an individual which defies immediate recognition. Also, many youngsters begin an interest in entomology by collecting a few common species in such groups, and by keeping adults or rearing through from the early stages. Such interest deserves encouragement and development towards a deeper involvement in entomology. The future of this Society, and of the subject in general, depends upon recruiting and holding the attention of enthusiastic youngsters. Therefore, I am in favour of tolerance towards some collecting of these groups rather than total prohibition as has happened in some other European countries.

Establishments, introductions and related issues

These are controversial subjects, and again the JCCBI has produced sensible guidelines in 'Insect re-establishment — a code of conservation practice' (1986). I believe that when properly carried out, these activities have a positive role to play in the conservation of some threatened species, at present mainly among the Lepidoptera. In future there will be opportunities to extend the use of re-establishments to other invertebrate groups. However, I would like to sound a note of caution here, because some recent enthusiasm for insect re-establishments as a conservation tool has not, in my view, been tempered with sufficient realism.

Re-establishments should be used to try to reverse the declines which have taken place in groups such as Lepidoptera where there is enough knowledge of captive rearing and habitat requirements. However, the lack of this knowledge for most invertebrates creates practical limitations in the value of this approach. For example, when a relatively conspicuous butterfly disappears, because a site is no longer suitable, many other insects which share a need for similar habitat conditions may also disappear. However, if appropriate habitat conditions are restored, it may be possible to re-establish the lost butterfly — a perfectly valid conservation activity — but it will not be possible to bring back the numerous unseen beetles, bugs, flies and the myriad other invertebrates which comprise the great majority of the fauna. The site with the re-established butterfly will remain impoverished for much of its invertebrate fauna, though a superficial inspection might suggest it has been completely restored to its former state. Therefore, those sites which retain continuity of conditions, and their associated scarce butterflies and other invertebrates, are extremely precious because they cannot be recreated. They demand our best efforts to maintain their richness and variety intact, hence preventing site extinctions in the first place is preferable to regarding loss of invertebrates as being generally reversible.

In my view the value of introductions, habitat translocations and habitat creation for invertebrate conservation is rather different and more limited than that of re-establishments. Habitat translocations are now promoted, by those wishing to develop important conservation sites, as viable alternatives to *in situ* conservation. While it may be possible to succeed in giving an illusion of success through what are often cosmetic publicity exercises, severing assemblages of plants and animals from the location where they have developed over long periods of time is not a rational alternative to the proper protection of SSSIs and other significant sites. However, if the impression is given that, for instance, a handful of attractive and conspicuous insects constitute an acceptable invertebrate assemblage, rather than part of that fauna which should be present alongside many other less observable species, then the perceived value of *in situ* conservation stands to be undermined. At a time when high cost and high profit development is growing in Britain, such erosion of the

conservation case could be most damaging. Introductions, and habitat creation have a central part to play in urban conservation, and the restoration of areas denuded of wildlife interest through industrial developments or intensive agriculture. However, they are not alternatives to conserving ancient, semi-natural habitats.

The need for a better understanding of invertebrate conservation

It is paradoxical that those life history features, physiological characteristics, and specialized adaptations, which have made invertebrates so successful in terms of their diversity and abundance, also render them vulnerable to environmental changes caused by man. It is perhaps the general success of invertebrates, coupled with their small size and often retiring habits, which hinders perception of the fragile status of many species. Excepting butterflies, there is little general appreciation by naturalists, or the general public, of the scale of invertebrate declines in recent decades. Losses of higher plants or birds are more readily recorded, receive much greater attention, and are generally viewed with more concern than the disappearance of invertebrates. Also, because some invertebrates are notorious as crop pests or disease vectors, many people do not recognize the need for invertebrate conservation. We have much to do through education to demonstrate that most invertebrates are beneficial to man, or economically neutral, and that the activities of many species are essential to the proper functioning of healthy ecosystems.

The scale of the problem of declines in invertebrate species has been well summarized elsewhere. Suffice it to say that 1786 taxa were included in the Red Data Book for British insects (Shirt, 1987) as being currently under some degree of threat. This represents 14.5% of the species in the insect groups reviewed. It is noteworthy that almost all the data on the status and the degree of threat to these species originated from studies carried out by amateur entomologists. If we accept that many species are vulnerable to further declines, and even extinction in Britain, then what action can we take? The following sections attempt to review briefly some basic principles for conserving invertebrates, and to put into words intuitive concepts familiar to many field entomologists. Although it is necessary to have a detailed understanding of the needs of individual species to conserve them successfully, a grasp of the basic principles is what we must communicate first to those working in conservation.

The influence of weather and geographical factors

There are large scale effects of Britain's climate, and also of variations in weather from year to year, which influence the distribution and abundance of invertebrates. It is well known that for most groups there is a decline in the number of species from south to north, which has been linked to the higher average temperatures and sunshine hours required by many southern elements in our fauna. However, there are considerable differences between groups in this species richness gradient. The butterflies (Fig. 2) show a marked decline from south to north. The data for post 1970 resident species has been abstracted from Heath, Pollard & Thomas (1984) here excludes the large copper, large tortoiseshell, the clouded yellows, red admiral, painted lady, and species which became extinct before 1970. This pattern might be expected for insects which are typically sun-loving, and whose larvae exploit hostplants growing in hot microclimates. Such conditions enable them to complete their life cycles within the short growing season in our generally cool and cloudy climate.

For another group of insects, the snail-killing flies or Sciomyzidae, the decline in species richness from south to north is much less pronounced. The data for Fig. 2 has

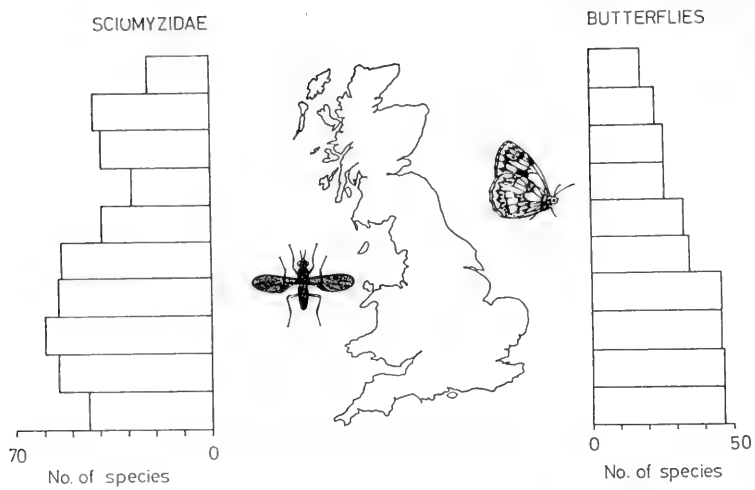

Fig. 2. The changes in species richness with latitude in Britain for butterflies and snail-killing flies.

been abstracted from Ball & McLean (1986). These flies have larvae which are predators or parasitoids of terrestrial and aquatic molluscs. Although some Sciomyzidae are adapted to attacking terrestrial molluscs in 'hot' calcareous grasslands or dunes, in common with their prey the majority of these flies live in wetlands and woodlands. These cool, humid situations are present throughout Britain, and if the recording coverage were as good as for the butterflies, it is likely that there would be even less of a fall off in species numbers than is shown here.

Some recent evidence that butterfly populations are more variable in abundance in northern Britain than in the south has been published by Pollard, Hall & Bibby (1986). They found greater fluctuations in the index values for the meadow brown at five sites in Scotland compared with five sites in southern England (their figure 9 on page 27). This is but one aspect of the findings from the national Butterfly Monitoring Scheme, which has convincingly shown the effects of weather factors in causing widespread fluctuations in butterfly numbers from year to year. It is likely that many other invertebrates will also be affected by weather in similar ways. What are the implications of this for conservation? Considering the higher rates of habitat loss and change in the south, coupled with observed trends in species richness, suggests that more invertebrates are at risk from habitat loss and change in the south. However, invertebrate populations which fluctuate more in the north may be more vulnerable to local chance extinctions in the long term. Also, recolonization may be slower here, because the average weather conditions are cooler and cloudier, and this may restrict dispersal and colonization.

If a general change in our climate takes place in response to global warming, invertebrates are likely to respond more rapidly than most other wildlife. At present it is unclear how our weather patterns might change, but if invertebrate species are to respond successfully by changing their distribution and range, there must be the opportunity for them to move to suitable habitat within the distance they can disperse and colonize. Because remaining examples of good quality habitat are generally isolated from each other, the balance of probability is that many of the scarcer, threatened invertebrates are not sufficiently mobile to move on to new sites.

Unless there is the chance to promote their dispersal along suitable 'corridors' (which is difficult to envisage because of the specialized needs of most species), then climate change coupled with the limited areas of semi-natural habitat remaining, may cause substantial losses for our invertebrate fauna in future.

Characteristics of invertebrates

Most invertebrates share some fundamental characteristics which are familiar and obvious to entomologists, though they are less well appreciated by many conservationists. These characteristics have major implications for the practical conservation of invertebrates, which presents a distinctive challenge perhaps greater than that set by most plants or vertebrates.

Annual life cycles. The great majority of insects and other invertebrates have annual life cycles, though a few species have more than one generation each year, and some others may spend one or more years in their early stages of development. *Implications*: appropriate conditions must be present for the growth, development and reproduction of most invertebrates every year. Even a break in continuity of a single year in the availability of a vital habitat resource, is likely to result in extinction of associated invertebrate populations. This is in contrast to many plants, which may persist through unfavourable conditions in a vegetative, non-reproductive condition, or can utilize dormant seeds or rootstocks to survive. Additionally, many vertebrates, though by no means all, have longer generation times, with more than one year spent in an adult, potentially reproductive condition. This provides a possible mechanism for overcoming unfavourable conditions.

Life stages have different needs. The complex life cycles of insects and many other invertebrates are well known to entomologists and other naturalists. For many species the different life stages have contrasting ecological requirements, which must be present every year within the areas they inhabit. *Implications*: habitat needs of invertebrates are usually more diverse than those for higher plants, or many vertebrates , and generally must occur in close juxtaposition because many invertebrates have limited mobility (see below).

Specialization. Invertebrates have evolved to exploit an immense range of niches, many of which are very narrow and specialized. This is one reason why many invertebrate species can co-exist in terrestrial habitats; they have partitioned the available resources very finely. Because of their small size they can exploit tiny 'packets' of food resources, which would be too small for most vertebrates to utilize. For example, flying insects can remove minute amounts of nectar from each flower they visit in order to fuel their activity. Additionally, different species show individual preferences for the flowers in bloom at any one time, and indeed some adult solitary bees will forage at only one flower species for pollen and nectar. *Implications*: a wide range of potential niches must be consistently sustained in any habitat, if the full characteristic invertebrate fauna is to persist and thrive.

Restricted mobility. Although some invertebrates have good powers of dispersal, for example, adult *Aeshna* dragonflies or certain butterflies such as the vanessids, many are relatively immobile. This might be expected for invertebrates such as molluscs, which are not noted for their speed over the ground, but it is becoming apparent that many insects capable of flight have behaviour patterns which confine most individuals to relatively small areas. This has been elegantly demonstrated for the silver-studded blue (Ravenscroft, 1986) and the heath fritillary (Warren, 1987*b*). *Implications*: the varied ecological needs of each invertebrate species must be consistently sustained within their dispersal range. For species exploiting ephemeral habitat conditions or resources, a fugitive lifestyle leads to frequent colonization

followed by local extinction. When habitats become fragmented, or the required conditions are not created through management or disturbance, then more general declines are likely to set in. Even if the required conditions are subsequently re-established, they will not be exploited if they are beyond the dispersal range of the species concerned.

Microclimate needs. Invertebrates are small, and largely regulate their body temperature through behavioural mechanisms. In our variable temperate climate, weather conditions are frequently a decisive factor limiting invertebrate activities. There can be conflict between the need to bask in the sun to raise body temperature and hence increase the level of activity, and the need to avoid water loss which is higher in sunny and windy conditions. Also, different invertebrates are adapted to exploiting particular microclimate conditions, and even within small areas of the same site, there will be considerable variation in the nature of the fauna resulting from such factors as the levels of sun or shade, exposure to wind, and degree of humidity. *Implications*: the physical structure of a habitat is a crucial factor in determining the potential range of microclimate conditions which can be exploited by invertebrates. This physical structure is modified by human influence through management, such as the level of grazing on grasslands and heathlands, or the pattern of felling or coppicing within woodlands. Invertebrates typically respond to microclimate changes more rapidly and sensitively than higher plants or vertebrates.

Some habitat features required by invertebrates

The characteristics of invertebrates discussed above result in some habitat features being of vital importance for the survival of many species. Although these features will be familiar to entomologists as good spots to search, their significance is often overlooked by other naturalists because plants and vertebrates are not so dependent on these situations. However, a wider recognition of their importance in future could lead to more effective conservation of their associated invertebrate assemblages.

Bare ground. On a variety of substrates bare ground offers a hotter microclimate than vegetated ground, and also clear hunting terrain for many predatory invertebrates. Some species bask to raise body temperature, others exploit oviposition sites on bare ground. Whether on damp peat, dry sand, or on other soils, bare ground is a vital feature in many terrestrial and water edge habitats. The distinctive invertebrate fauna dependant on bare ground includes many species which will disappear once the surface becomes vegetated; these include ground nesting bees and wasps, ground and rove beetles, butterflies, bugs, robber and bee flies. All too often bare ground is viewed by botanists and other naturalists as being ground deficient in vegetation cover as a consequence of mismanagement, and active steps are taken to promote plant growth and succession. Firm, bare sand on coastal dunes, along heathland paths and tracks, south-facing sand cliffs in old sand pits and on steep exposures elsewhere, all have their own associated fossorial aculeates. River shingle (Fig. 3), and silt or mud beside rivers and ponds are home to many beetles, bugs and flies. There are many other examples which could be given, suffice it to say that bare ground is an important habitat feature which has its place wherever the activities of man or grazing animals can sustain it. *Implications*: bare ground must be continually created and re-established in terrestrial habitats if the associated invertebrates are to survive. The extent of bare ground should be measured routinely as part of nature reserve monitoring, and increased levels of appropriate management should be applied when the area of bare ground decines.

Vegetation structure. Many insects are associated with host plants growing in a narrow range of ecological conditions, often in association with plants of a particular

Fig. 3. The River Spey at Aviemore. River shingle supports a specialized invertebrate fauna, including a high proportion of species not found in other habitats. However, wildlife interest for plants or vertebrates is low, and it is only recently that the invertebrate conservation interest has been more widely appreciated.

stature and 'apparency'. Good examples are known for butterflies, for instance, those associated with chalk grassland have distinctive turf height preferences (Butterflies Under Threat Team, 1986). *Implications*: levels of grazing in grasslands, heathlands and coastal habitats, and patterns of clearance in woodlands, are examples of management regimes whose intensity determines the nature of the associated invertebrate fauna. The decline of many chalk grassland butterflies following myxomatosis in Britain, has been convincingly shown to be the consequence of the growth of taller vegetation (Thomas, 1983*b*; Thomas *et al.*, 1986). Even though the correct larval foodplants can still be present, they are essentially unavailable because they are too cool and shaded within a longer sward. The monitoring and retention of suitable vegetation structures is a key point for future successful invertebrate conservation in Britain.

Shade. Many insects require hot, sunny conditions for their development and activity, notably butterflies (Thomas, 1986). Others prefer cool, shaded areas to avoid desiccation. The shade lovers include many flies, molluscs, spiders, beetles, isopods and myriapods. They comprise much of the fauna associated with dead wood, leaf litter and other decaying vegetation, some water margin species, and those found in tussocks. *Implications*: the abandonment of coppicing and general neglect of ride management in many deciduous woods, means that shaded conditions are more widespread now than in the recent historical past. This has resulted in the decline of many woodland butterflies such as the heath fritillary (Warren, 1987*c*). However, there is a need for shade in old forests which have rich dead wood faunas, and along some sections of rivers. Here unnecessary felling or other disturbance to these areas should be avoided.

Aspect. South-facing slopes warm up faster, and reach higher temperatures near

to ground level, than slopes with other aspects. North-facing slopes are coldest, while areas which are predominantly east– or west-facing are warmer at the beginning and end of the day respectively. Shelter from prevailing winds can also result in glades in woodland or scrub, or south-facing hollows in open habitats, achieving a locally hot and favourable microclimate for promoting invertebrate activity. *Implications*: when planning site management, it is necessary to recognize the effects of aspect on the composition of the invertebrate fauna. Species requiring warm conditions, especially near the northern limit of their range, will favour slopes with a more southerly aspect, while those living in cool, shady and moist situations will generally prefer slopes with a northerly aspect. However, the distribution of individual species can change from year to year according to weather factors and patterns of management.

Water levels. It is axiomatic that wetland habitats should have water tables near the ground surface. However, in many parts of Britain land drainage and water abstraction make this increasingly difficult to achieve for the site manager. If wetland sites dry out, shrubs and trees will become established on previously open habitat, and the margins of open water will change, with shallow water areas drying out seasonally or permanently. Although the successional encroachment by carr can be resisted by some form of rotational clearance, possibly combined with grazing, the drier ground surface will become unsuitable for many soil-dwelling species. The water margin invertebrate fauna (which is estimated to comprise in excess of a thousand species in Britain) is dependant upon distinctive hydrological regimes in different habitats. Lowered water levels will result in the loss of characteristic water margin invertebrates in wetland habitats, for example, from the edges of ditches in grazing levels marshes. Also, the freshwater fauna will suffer when smaller water volumes in pools, ponds and ditches lead to increased nutrient concentrations leading to growth of algae, loss of macrophytes, and depletion of available oxygen. *Implications*: achieving hydrological control for wetlands is the first consideration when planning the conservation of their invertebrates. This can be a high, relatively stable water level for many peatlands, whereas grazing levels marshes and other mineral marshes may have naturally lower water levels through the summer and autumn. Flood plain wetlands may have more erratic water levels, which can fluctuate greatly over just a few days. However, over-deepened river channels created to improve land drainage have led to a more general drying out of old water meadows and other riverside areas. Breckland meres and pingo hollows have naturally fluctuating water levels, but the increased rate of water abstraction, much of it for agricultural irrigation, threatens more lengthy desiccation of these pools through a permanent lowering of the water table. Temporary pools support invertebrates not found in other water bodies, for example, the fairy shrimp *Chirocephalus*. An understanding of the past as well as the present hydrology is vital for the successful conservation of wetland invertebrates.

Accumulations of dead material. Many invertebrates feed on dead organic materials, breaking these down and enabling nutrients to be re-cycled. They often act in co-operation with fungi, typically invertebrates undertaking physical break-down, and fungi biochemical degradation. Examples of substrates exploited include dead wood, leaf litter, carrion and dung. Of these the first supports the greatest number of invertebrates of conservation concern (see Speight, 1989) with many species having declined as a consequence of the long history of intensive forest exploitation by man in Britain and western Europe. Only a handful of sites remain with a good representation of what are now termed saproxylic (from the Greek rotten-wood) invertebrates. Concern for this fauna has resulted in a recommendation from the Council of Europe Committee of Ministers to governments of member

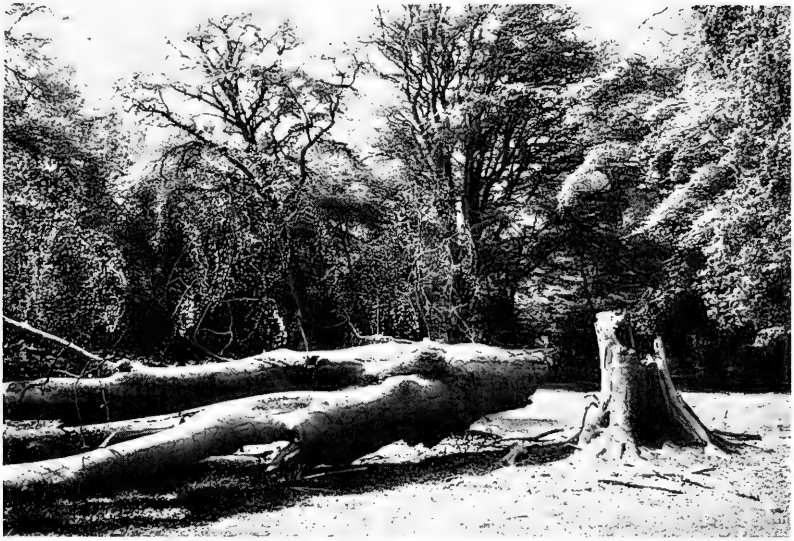

Fig. 4. Mark Ash in the New Forest. Ancient oak and beech trees in the New Forest support many threatened invertebrates associated with such features as decaying timber, rot holes, sap runs and fungi.

states (1988) urging action to conserve these threatened invertebrates. *Implications*: dead wood and other natural accumulations of organic material should be recognized as significant features for invertebrates on conservation sites and elsewhere. On sites known to have exceptional assemblages of threatened invertebrates associated with dead wood (such as Windsor Forest and the New Forest, see Figure 4), future management must seek to retain the maximum number of ancient trees and leave in place standing and fallen dead wood.

Management principles

Consideration of the characteristics of invertebrates, together with the habitat features they require, demonstrates that continuity in the availability of resources, and hence consistency of approach on management issues are vital. The general principles discussed here are only the first stage in planning conservation management for a site. For example, the integration of detailed prescriptions for individual threatened species is a further step which is highly desirable whenever possible. With the high rates of loss of semi-natural habitats in recent years, many conservationists have quite naturally concentrated on site protection. This has led to a relative neglect of sound, consistent management, which has probably been more damaging to invertebrates than to other wildlife. Short-lived early successional stages, which are essential for many invertebrates, have been particularly disadvantaged through interruption of the regular intensive management input required.

Keep traditional regimes. Many habitats in Britain have been intensively managed by man for centuries. Familiar examples include woodland coppicing, long-established patterns of grazing of heathlands and grasslands, and hand clearance of ditches on grazing marshes. These have all resulted in the development

of distinctive assemblages of invertebrates adapted to exploiting the conditions created. The abandonment of these practices has led to the decline and disappearance of many of the scarcer, specialized invertebrates most closely tied in to features created by annual, intensive management. *Implications*: whenever assessing the type of conservation management for an area which has received consistent treatment in the past, the safest option to consider first is to stay as close as possible to established practice. This usually applies even when the management appears to be damaging, for example, regular burning or over-grazing of early successional stage habitats. Initially, such areas can look aesthetically more attractive when released from intensive management, but this is misleading because their invertebrate fauna, and eventually the flora and other wildlife will change fundamentally.

Retain mosaics. Almost instinctively, many entomologists home in on places where there is varied vegetation structure, for instance, grassland with a combination of tussocks and short turf with some bare ground, or the salty pools and flowery expanses of the upper reaches of saltmarsh. This is because experience has shown that such spots are good for finding many species. In the first example cited, man influences the structure by regulating the intensity and duration of grazing, while in the second example given, natural processes sustain the mosaic. The different needs of immature compared with adult insects, or of adult insects when foraging for food in contrast their requirements for ovipositing, can be catered for by the close juxtaposition of short and tall vegetation. At a larger scale, the occurrence of different habitats in combination is essential for some invertebrates, for example, those living in shaded woodland as larvae, but feeding at sunlit flowers as adults. *Implications*: a change in the nature or intensity of management can result in the loss of mosaic structure, with a consequent reduction in invertebrate interest. An awareness of the value of mosaics at different scales is needed if nature reserves and other areas are to remain at their best for invertebrates.

Use of rotational management. Many habitats have features which are best sustained by some form of rotational management. Examples include woodland rides and coppice panels, ditches on grazing marshes and *Phragmites* or *Cladium* fens. In each case there are invertebrates which depend upon this repeated imposition of cutting or clearance to regenerate early successional stages. *Implications*: there is a contrast in approach between these forms of rotational management which are best undertaken on a constant time cycle, and those which require some temporal flexibility. In general, ride management, coppicing, pollarding, fen cutting, cutting or burning of heathlands, and grazing of grasslands are best carried out on a reasonably constant cycle. However, ditch clearance, scrub control and cutting vegetation beside water bodies, can be undertaken more irregularly, with the operation carried out when the degree of regrowth has reached the desired successional or structural stage. In either case a good maxim is 'little and often', with some management activity each year on a systematic basis, rather than occasional intense activity with an absence of early successional stage conditions in those years when no management takes place.

Diversity can be dangerous! Digging new ponds, or planting trees in open grassland or heathland, are examples of measures designed to increase habitat diversity, sometimes with the intention of benefiting invertebrates. *Implications*: there can be problems maintaining the original wildlife interest of sites subjected to poorly conceived diversification. For instance, the increased evaporation from a new pond can lower the water table in the vicinity, thereby damaging adjacent wetland communities. Planting trees can promote undesirable scrub establishment or shading of open ground species. Within ancient semi-natural habitats proposals to increase

diversity should be examined very critically. Conserving sites for their primary interest, rather than creating diversity for its own sake, should be the aim.

Conservation steps

A rational sequence of steps can be identified to tackle conservation issues effectively. All too often conservation activities are carried out with great enthusiasm but without a systematic approach to solving problems. Adoption of a check list of steps to tackle site and species conservation should help us to achieve better results in future.

Identification: species and sites. Concentrating efforts on threatened species declining and in danger of extinction, and on sites with exceptional assemblages of such species, are but two examples of the need to identify conservation targets accurately. Assessment of the degree of threat to individual species always involves a considerable degree of subjectivity, even when ranking and scoring systems are adopted (as in the British plant Red Data Book, Perring and Farrell 1983). Much has been written on site assessment for invertebrates (see references in Luff, 1987; Eyre *et al.*, 1986). Ideally, gathering data in a systematic way, which allows a classification to be created which groups sites with a similar fauna together, should precede assessment procedures. This should be coupled with the need to ensure good representation of the strongest populations of rare and threatened species and the richest known assemblages. Because of the lack of systematically collected invertebrate data for most habitats in Britain, this latter representational approach currently offers the best practical solution to identifying significant invertebrate sites.

Understanding: biology and ecology. To prepare conservation plans for threatened species or management plans for sites, requires an understanding of the life history requirements for the species and knowledge of the responses of communities and populations to alternative management regimes. Butterfly ecologists such as Jeremy Thomas and Martin Warren have developed an approach for threatened butterflies which is an excellent model for adoption and adaptation when investigating other groups. There is so much still to learn about invertebrates in these contexts, and there is tremendous scope for members of this Society to contribute original findings. Although Britain has the most intensively studied invertebrate fauna in the world, many species have undescribed early stages and unknown habitat needs, and the distribution and status of species outside the 'popular' groups is frequently unclear.

Implementation: safeguard. When the data has been gathered and the plans made, the next stage is implementing the correct course of action on the ground. Site safeguard depends on the availability of suitable legislation, resources for conservation and political support.

Implementation: management. Ensuring consistent application of appropriate management is the next step, and this is often vulnerable to human factors. Conservation officers and reserve wardens change regularly, and they naturally differ in their interests and approach to nature conservation. It is the role of reserve management plans to set clear long-term goals and to encourage consistent standards of implementation. There is great potential for entomologists to be more involved in reserve management to ensure that what is done is compatible with the needs of invertebrates.

Monitoring: feedback to implementation. Because invertebrate populations respond rapidly to environmental changes, they have great potential as indicators of habitat health and conditions. The Butterfly Monitoring Scheme is the only national invertebrate monitoring project linked directly to the needs of site conservation.

Ideally, additional invertebrate groups, with habitat needs different to those of butterflies, should be monitored consistently on nature reserves and other sites. Due to lack of resources and knowledge this is unlikely to come about in the near future. However, it is possible to envisage that consistent monitoring of habitat features, of value to invertebrates, could be incorporated within the monitoring of SSSIs, county trust reserves and other significant sites. Some suggestions of how this might be done are listed in Table 1. Detailed monitoring of invertebrates which respond rapidly to changing environmental conditions is preferable because it gives direct information about their abundance. However, this is time-consuming and difficult compared with the cruder measures outlined here. In the short term it is more practical to envisage a wider adoption of habitat feature monitoring, which should serve to raise awareness of what invertebrates require, and will detect gradual habitat changes taking place over long periods. Fixed point photography is a rapid, cheap and effective technique in many habitats.

Table 1. Some techniques for monitoring habitat features of value to invertebrates (references give information on methods).

Bare ground	Use target notes on site maps Measure percentage cover using quadrats
Water levels	Use dip wells (Rowell, 1988)
Ride structure	Measure ride width and tree height
Ride shading	Hemispherical photography (Warren, 1985)
Vegetation height (grassland etc)	Use hardboard disc (Butterflies Under Threat Team, 1986)
Fixed point photography	Use to assess vegetation structure and composition (Smith *et al.*, 1985)
Aerial photography	Use to assess large scale vegetation features (Howard, 1970; Paine, 1981)
Numbers of flowers for key plants	Count standard length sections in transects along woodland rides, count numbers in quadrats, or estimate flower numbers using DAFOR* scale.

Communication. For those working on conservation, access to up-to-date information about all aspects of invertebrates is nearly impossible because the published literature is scattered in so many books and papers. Even when the data have been obtained, which would enable a site or species to be conserved successfully, ensuring it reaches those who make conservation decisions is difficult to achieve. It has been a central aim of the NCC's Invertebrate Site Register to communicate relevant information on invertebrates to those working at a practical level in conservation. The national species reviews currently in preparation will collate what is already known about scarcer species, and draw attention to gaps in knowledge.

Long-term goals and perspectives. One of the major challenges facing conservationists is setting positive long-term goals and objectives. Much of the process of site defence is viewed by our opponents as essentially negative. This is because of our need to object to proposals which are perceived as economically positive, in that they do such things as create employment, or raise productivity or income, from areas of land. Setting positive conservation targets includes the retention of intact prime habitat examples in a condition above a defined minimum standard, or the maintenance of threatened species populations above a prescribed level. Invertebrates have a central role here, with many potential indicator species in terrestrial and freshwater habitats. The identification of criteria for success must include standards against which natural or man-induced changes can be measured. There is

* Dominant – abundant – frequent – occasional – rare.

the need to take a longer view of what constitutes conservation success; after all, a decade of safeguarding a site or population means little if extinction follows subsequently. Many of those working in forestry seem to have developed this longer term view of site management, which is lacking in much conservation planning.

What invertebrate conservation has to offer

Historically, those seeking to promote invertebrate conservation have had to argue for the needs of these animals to be met within the framework of conservation strategies developed to protect higher plants and vertebrates. This has put invertebrate conservation into a defensive posture, which has restricted the development of the subject, and led to the widespread attitude that the subject is too big and complex to tackle. I would like to suggest that because invertebrates are difficult and demanding to conserve, we have something distinctive and different to offer the rest of conservation, namely higher standards to achieve, and deeper ecological insights into what is necessary for long-term conservation success. If we can get this message across, then conservation as a whole, as well as the protection of invertebrates, stands to benefit through our efforts.

Because invertebrates exploit such a wide range of niches, to conserve a fully representative fauna requires the adoption of management policies which are compatible with maintaining the other wildlife groups with which invertebrates are associated. There should not be conflicts between well-formulated proposals to conserve invertebrates, and maintaining the needs of other wildlife groups.

New ways of viewing wildlife conservation. It is a familiar concept that naturalists see, or overlook, different species or other aspects of the natural scene, as a consequence of the kind of wildlife they study. This results from their perceptions being orientated by the need to specialize, in order to find species of interest, or to understand how species interact. When botanists look at an area of semi-natural vegetation, they see different facets of the habitat, compared with ornithologists or entomologists. However, even between entomologists studying different groups there are major differences in the way habitats and their features are viewed. In order to conserve plants and animals better there needs to be better communication between naturalists and conservationists on how habitats should be managed. If entomologists can synthesize their views on what constitutes habitat features of value to a wide range of invertebrates, and help other naturalists and conservationists to 'see' with an entomologist's eye, this is a good first step towards getting invertebrate conservation accepted. It also offers the promise of developing, changing and refining some long-established precepts of nature conservation. This will benefit and renew nature conservation itself in the widest sense.

Novel ecological understanding. A good example is the more dynamic view of how to manage habitats, including the value of early successional stages, which has recently come about. The studies of scarce butterflies by the Institute of Terrestrial Ecology (Dempster & Hall, 1980; Thomas, 1980, 1983*a*,*b*, Thomas *et al.*, 1986; Warren, 1987*a*,*b*,*c*) have contributed greatly to our knowledge of how such factors as vegetation structure, regular management, adult mobility and weather influence their populations. The detailed investigation of a range of threatened, specialized invertebrates with contrasting ecological requirements, offers the chance to improve our understanding of the functioning of other aspects of habitats. For example, the mobility and persistence of insects exploiting ephemeral resources in dead wood, or the effects of contrasting hydrological regimes on wetland invertebrates, could modify current views of the management of forest and wetland habitats respectively.

Invertebrate ecologists are in the forefront of developing the applied science of nature conservation, having new approaches to offer on familiar issues.

Indicator species. Some invertebrates are excellent indicators of past and current ecological conditions. They respond rapidly to environmental change, they include many highly specialized species, they are liable to local extinction if conditions are unsuitable even if only for a single year, and they exploit habitats previously ignored as unimportant by conservationists. They have the potential to tell us much more about the history of our countryside. For example, Rackham (1986) has developed the interpretation of historical and vegetation features for detailed analysis of how man has shaped the British landscape and wildlife. This type of approach has scarcely been tried for most invertebrates. Some studies have analysed observed patterns of distribution, status and habitat fidelity (Dennis, 1977; Harding & Rose, 1986). Others have examined the recent history of our beetle fauna from fossil evidence (Buckland, 1979; Coope, 1970).

Conservation implementation. The consistency of approach needed to conserve most invertebrates successfully will benefit other wildlife in the long term. Although plants may respond to habitat changes more slowly than invertebrates, it is known that eventually they will be adversely affected by, for instance, lack of traditional grassland or heathland management. The high standard of implementing conservation management necessary for invertebrates, is compatible with sound long-term conservation policies for other wildlife. This should give us confidence when promoting well formulated proposals to protect invertebrates, that we are assisting the wider development of nature conservation.

Future trends for invertebrate conservation

As long as economic growth in Britain sustains present levels of road, housing and industrial development, a significant number of important sites will continue to be damaged. Agricultural practices are intensive and damaging to wildlife over much of lowland Britain, giving little chance for many invertebrates to colonize new sites. The picture is similar throughout the EEC, so there is an immense task confronting us if the losses and declines are to be stemmed, and more positive policies are to be adopted to benefit wildlife, including invertebrates, in the wider countryside. Against this must be set a number of encouraging current trends in the growth and development of invertebrate conservation. These give grounds for hope that many sites and species will be conserved as a result of informed efforts to incorporate invertebrates within conservation programmes.

Wider popular appeal. There has been an encouraging growth in the popularity of many invertebrates, both as subjects of television programmes and in books lavishly illustrated by close up colour photographs. The television programmes attract high viewer ratings and the books sell well. Invertebrates appear novel and often bizarre, being obviously different in appearance and behaviour to other animals. This wider interest is laying the foundation for stronger support to the view that invertebrates are worthy of conservation attention and resources. The suggestion that invertebrates should be conserved would have been ridiculed by many only a few years ago, but is now widely accepted.

Recognition of more groups. Butterflies are a key flagship group for invertebrate conservation, their disappearance from many areas has led to concern and support for butterfly conservation from many people who do not have an involvement with other insect groups. The growth of the British Butterfly Conservation Society indicates the potential for conservation of other 'popular' groups. For instance, Odonata (with strong conservation backing from within the British Dragonfly

Society), Orthoptera, bumblebees, hoverflies and ladybirds are all being more widely regarded as interesting, generally beneficial insects, worthy of conservation attention. The next challenge is to bring in such groups as spiders, beetles, bugs, flies and molluscs which are acknowledged by specialists as having good potential indicator species, but as yet are not recognized by many conservationists as meriting much attention. This is likely to change over the coming decades, as invertebrate conservation becomes more broadly established.

The role of computing. More and more entomologists have a computer at home, which can be used to store and process invertebrate records. This takes a lot of the drudgery out of handling records, for example, compiling site lists built up over several years, though it can be hard work catching up with entering a large backlog of data. There are prospects of better data exchange following the development of the biological database package 'Recorder' by my colleague Stuart Ball. This aims to improve communication between organizations holding biological records on computer databases, and should help overcome the current problem of entomologists being requested to send the results from a field visit to NCC, BRC, county trust and the local record centre. Better communication of entomological data is essential if the results of a higher level of recording and study are to benefit conservation.

The role of the BENHS. Members of this Society have a natural interest in seeing their favourite localities managed sympathetically to retain their special interest, and in seeing scarce species conserved for future generations of entomologists to study and enjoy. It is in the Society's and members' own interests to become involved in these matters, and to speak out on conservation issues more in future — as my predecessor Professor Owen has done recently over the management of Windsor Great Park. Plants, birds, reptiles, amphibians and mammals all have their supporters who lobby for conservation of these groups; insects and other invertebrates must not be neglected. Concentrating efforts on an important site, or a threatened species, is a good conservation tactic, and adopting a site or species for intensive study has its own considerable entomological interests and rewards. The Society has an important role to play in encouraging these approaches to entomology.

The prospects for entomology and this Society

There has been a growth in entomological activity generally in Britain in recent years, greatly stimulated by the publication of well-illustrated identification guides, for example, Hammond (1983) for dragonflies, Stubbs & Falk (1983) for hoverflies, and at a more general level the introductory books by Chinery (1973, 1986). There remains the need for more books of this kind to encourage entomologists to take up the study of neglected groups. This Society is playing a vital part here through the publications programme, which aims to product practical guides and keys for use by the field entomologist at a reasonable price. The growth of the national recording schemes, coordinated by the Biological Records Centre, has also done much to increase the amount of invertebrate recording, enabling the activities of many entomologists to contribute towards a better understanding of our fauna. More recently, local record centres have initiated county mapping projects, particularly for the popular butterflies, dragonflies and some moths, but in some cases even extending to other invertebrates such as beetles, flies or some non-insect groups.

These are encouraging signs of increasing interest in British invertebrates among amateur naturalists. However, at the same time there has been a decline in the number of professional entomologists employed in the traditional fields such as taxonomy, invertebrate ecology and agricultural entomology. Posts have been lost,

or transferred into other fields, at the national museums, universities and research institutes. However, there has been a modest increase in the number of entomologists employed at local museums and record centres. These trends seem likely to continue for the foreseeable future, with only limited opportunities for careers in entomology, but at the same time thriving recreational entomology, encouraged by the increased leisure time available to many.

The closer links now developing with other European countries will, I am sure, encourage us to have more contacts with our overseas entomological colleagues. We all have a lot to gain by looking at our invertebrate fauna in its European context, and by participating in the preparation of identification works for a wider geographical range, as has already happened with the excellent *Fauna Entomologica Scandinavica* series. In future we can expect that improved communications will further promote international entomological meetings and publications.

There is good potential for increasing membership of the Society to over a thousand and beyond. However, the officers of the Society are already fully committed in maintaining the current activities for a membership of around 700, so a larger membership would probably require some services to be paid for from the increased subscription income. We are a relatively small Society, with a friendly and welcoming attitude towards new members, and this spirit is a tremendous asset for the future. Through its field meetings, indoor meetings and publications, this Society will continue to offer much to the field entomologist in Britain to the end of this century and beyond.

Conclusions

In this address I have attempted to show what entomology and invertebrate conservation have to offer conservation on a wider basis. A major attraction of entomology for many of us is that the subject is never exhausted. Insects and other invertebrates are so rich in species, so elusive in their habits, and ever-changing in their numbers and status. The subject is vast and there is always so much more to find out.

If we are to continue to enjoy the pleasures of entomological discovery in the setting of a pleasant landscape, and if we aspire to hand on the possibility of such enjoyment to our successors, then a forthright advocacy of the needs of insects and other invertebrates is required. We have much to contribute, that is both distinctive and original, to conservation as a whole, and we need to join with other naturalists to make our voice heard on behalf of the special needs of invertebrates. Our hope of success is to lobby persistently, doggedly and fairly for our animals to be conserved. I am reassured to see these attitudes amongst many in this Society; let us work together so that young entomologists in the next century have the opportunity to enjoy the insects and other invertebrates we have been privileged to see.

What we desire to achieve is a countryside where familiar species can be seen more widely and where localities persist which are populated by fully representative assemblages of invertebrates, characteristic of the habitats concerned. This is the substance of our entomological heritage, which must not be replaced by the impoverished shadow of places which may retain their flora but are largely bereft of their invertebrate fauna. Most of what has come down to us has arrived through chance, but it will only survive in future through our own efforts, and with careful planning and design. The contributions of field entomologists, members of this Society, will be vital in giving invertebrates better prospects for the future.

Acknowledgements

It is a pleasure to thank my colleagues in the NCC for all their contributions towards developing invertebrate conservation. Their ideas and expertise have helped me greatly in preparing this address. I am also greatly indebted to those many entomologists in Britain, too numerous to name here, who are pursuing studies relevant to conservation. There is space to cite only a small selection of their work in the references below; their efforts are creating new opportunities to improve our chances of successfully conserving much of our invertebrate fauna in future.

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SHORT COMMUNICATION

A further Gloucestershire locality for *Meloe rugosus* Marsham (Coleoptera: Meloidae). — In a previous note (Alexander, 1989), I suggested that the Cotswold Hills may be a stronghold for the rare oil beetle *Meloe rugosus*. I have since encountered another specimen at a different locality. A female beetle was found by a friend's child in his sandpit in the garden at Ebworth Park Cottages, Fostons Ash, near Sheepscombe (SO 913116), in October 1988. The garden lies at the edge of an expanse of high quality limestone pasture which forms part of the Cotswold Commons & Beechwoods SSSI.

My thanks to John Fleming for bringing the beetle to me. — Keith N. A. Alexander, 22 Cecily Hill, Cirencester, Glos. GL7 2EF.

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SOME BIOLOGICAL NOTES ON BRITISH LESSER DUNG FLIES (DIPTERA, SPHAEROCERIDAE), WITH A LIST OF SPECIES KNOWN TO BE ATTRACTED TO FUNGI

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The recently published Handbook to the British species of this family (Pitkin, 1988) has permitted more confident determination especially of the Limosininae for which comprehensive genitalia figures are provided. While this included good coverage of biological information, the association of some species with fungi was not as fully treated as those associated with dung or carrion, although fungus associations were cited for 16 species. Records of 45 species which have been collected from fungi are given here. These include 16 species which have been reared from fungi, although only four of these have been reared in Britain.

Some notes on other habitats which augment the information given by Pitkin (1988) are also included as well as some data on little known species.

FUNGUS ASSOCIATIONS

A summary of information on this subject is given here, including previously unpublished data from my collection (P.J.C. in list). It is not expected that the list is complete but it is hoped that it will stimulate further observations. Several species reported from fungi elsewhere in Europe have not yet been found to have this relationship in Britain, but are included here to give some idea of the possibilities of further study. The identification of some species by Canzanelli (1941), however, must be regarded as dubious.

Most species involved are principally attracted to decaying rather than fresh fungi. Some may only be visiting as adults and single finds of adults on fungi may be fortuitous. However, several species are regularly found to be fungus feeders as larvae and some others may develop in fungi occasionally. None of the species listed appear to be confined to fungi or to have any monophagous association. Those species which have certainly been reared from fungi in Britain are marked *, those reared elsewhere are marked †.

Lotophila atra (Meigen)

On decaying fungi (Richards, 1930; Séguy, 1934; Papp, 1973; Roháček, 1989).

Borborillus vitripennis (Meigen)†

Ex *Boletus edulis* (Canzanelli, 1941).

Crumomyia nitida (Meigen)

On fungi (Richards, 1930; Hackman, 1965; Papp, 1973; Roháček, 1984); larvae in fungus (Macquart, 1835, believed by Roháček (pers. comm.), to be a misidentification, as he considers this species only occurs accidentally on fungi).

Crumomyia fimetaria (Meigen)†

On decaying fungi (Richards, 1930; Séguy, 1934; Duda, 1938; Papp, 1973; Roháček, 1980; Norrbom & Kim, 1985; Pitkin, 1988); on *Boletus*, *Armillaria*, *Meripilus* (P.J.C.); ex *Pyronema*, *Gyromitra*, *Morchella* (Papp, 1979); ex fungus-impregnated wood (Richards, 1934).

Crumomyia roserii (Rondani)*

Common on decaying fungi (Richards, 1930; Séguy, 1934; Duda, 1938; Pitkin, 1988); on *Phallus* (Smith, 1956); on *Armillaria mellea* and reared from it, Kent, Hosey Common, 29.x.1968, emerged 28–29.xi.68 (P.J.C.).

Crumomyia notabilis (Collin)

Holotype taken on fungi (Collin, 1902; cited by Roháček, 1976 and Pitkin, 1988); rotting *Boletus* species (Hackman, 1965; cited by Norrbom & Kim, 1985).

Ischiolepta pusilla (Fallén)†

Ex compost for cultivated mushrooms (Austin, 1937); on *Polyporus squamosus* (P.J.C.); ex *Coprinus atramentarius* (Papp, 1972); ex *Leccinum* (Papp, 1979).

Sphaerocera monilis Haliday†

Ex decaying fungi (Duda, 1920, 1938; Canzanelli, 1941); on decaying fungi (Richards, 1930; Papp, 1973; Roháček, 1980 and eight unpublished records); fungus on beech (Pitkin, 1988).

Sphaerocera curvipes Latreille

Decaying fungi (Roháček, 1984); rotting tree fungi and *Polyporus squamosus* (Roháček, pers. comm.).

Apteromyia claviventris (Strobl)*

Ex *Chondrostereum*, on *Pleurotus* (Chandler, 1973); ex *Inonotus hispidus*, *Boletus versipellis*, *Piptoporus betulinus*, *Bjerkandera adusta*, *Meripilus giganteus*, rotten *Polyporus squamosus*, *Lactarius turpis* (P.J.C.); ex *Suillus*, *Leccinum*, *Boletus*, *Gyromitra* (Papp, 1979; cited by Pitkin, 1988); ex *Lyophyllum fumosus*, *Russula vinosa*, *Lactarius deliciosus* group, *L. flexuosus*, *L. trivialis* (Hackman & Meinander, 1979). A frequent fungus feeder (also reported from fungi by Papp, 1973; Roháček, 1983, 1984; Marshall & Brown, 1984).

Chaetopodella scutellaris (Haliday)

On decaying fungi (Roháček, 1984); a series on *Coprinus micaceus*, Kent, Bromley, 11.ix.1971 (P.J.C.).

Coproica ferruginata (Stenhammar)

Ex many agarics and boleti (Canzanelli, 1941; not confirmed from other data and considered very dubious by Roháček, pers. comm.).

Coproica hirticula Collin

On decaying fungi (Roháček, 1984).

Coproica vagans (Haliday)

One male on decaying fungi (Roháček, pers. comm., who considers that *Coproica* are not true fungus feeders).

Gigalimosina flaviceps (Zetterstedt)

On decaying fungi (Roháček, 1983, 1984; Kuznetzova, 1987; cited by Pitkin, 1988).

Halidayina spinipennis (Haliday)†

Four reared from decaying tree fungi (Roháček, pers. comm.); on fungi (Roháček, 1983).

Kimosina plumosula (Rondani)

Visiting *Phallus* in Finland (Smith, 1956).

Leptocera fontinalis (Fallén)

On fungi (Haliday, 1836); on *Pholiota squarrosa* (P.J.C.).

Limosina silvatica (Meigen)

On decaying fungi (Haliday, 1836; Richards, 1930).

Minilimosina fungicola (Haliday)†

The types were collected on fungi (Haliday, 1836) but Collin (1956) found that three species had been confused under the name by Haliday, the others being *M. vitripennis* (Zetterstedt) and *M. v-atrum* (Villeneuve). More recently, Roháček (1981) found that most authors had confused *parvula* (Stenhammar) with *fungicola* and (1984) he considered *parvula* to be commonly associated with fungi while *fungicola* was only occasionally found on fungi. Kuznetzova (1986) reared one male

from *Lactarius mitissimus*. The rearings from ten genera of fungi reported for *fungicola* by Papp (1979), from *Leccinum* and *Lyophyllum* by Hackman & Meinander (1979) and that from *Boletus* by Canzanelli (1941) presumably require confirmation.

Minilimosina parvula (Stenhammar)†

Found on decayed fungi of the genera *Lactarius*, *Russula*, *Amanita*, *Phallus* and *Pleurotus* (Roháček, 1983) and reared from decaying fungi (Roháček, 1981, 1984).

Minilimosina splendens (Duda)

On decaying fungi (Papp, 1973; Roháček, 1977a, 1983; Pitkin, 1988); decayed *Lactarius*, *Leccinum* (Roháček, pers. comm.).

Opalimosina liliputana (Rondani)

On decaying fungi (Richards, 1930; Roháček, 1983, 1984; Marshall & Brown, 1984; Pitkin, 1988); on *Polyporus squamosus*, *Russula*, *Lactarius* species (Roháček, pers. comm.).

Opalimosina collini (Richards)

Two records from decaying tree fungi (Roháček, pers, comm., surprising for a coprophilous species).

Opalimosina czernyi (Duda)†

On *Hypholoma fasciculare* (Duda, 1938); on *Russula*, *Lactarius* and *Pleurotus ostreatus* (Roháček, 1983); predominantly fungivorous (Pitkin, 1988).

Opalimosina denticulata (Duda)

Two females on decaying tree fungi (Roháček, pers. comm.).

Opalimosina mirabilis (Collin)

On decaying fungi, especially tree fungi (Roháček, 1983 and pers. comm.).

Opalimosina simplex (Richards)

Two records from decaying tree fungi (Roháček, pers. comm.).

Paralimosina fucata (Rondani)

On *Phallus*, *Russula* (Roháček, 1977b); on fungi (Roháček, 1983, 1984; Pitkin, 1988).

Pullimosina heteroneura (Haliday)*

Larvae infesting cultivated mushrooms (Austin, 1937; Marshall, 1986; Marshall & Brown, 1984); ex *Leccinum scabrum* group (Hackman & Meinander, 1979).

Pullimosina moesta (Villeneuve)

Often common on fungi (Richards, 1930; this record may represent *P. antennata* (Duda) of Pitkin, 1988 according to Pitkin (pers. comm.)); on decaying fungi (Roháček, 1975, 1983).

Puncticorpus cribratum (Villeneuve)†

Ex *Gyroporus*, *Oudemansiella*, *Psathyrella*, *Cortinarius*, *Russula* (Papp, 1972; cited by Roháček, 1974, Pitkin, 1988 and Roháček & Marshall, 1982); on decaying fungi (Séguy, 1934).

Spelobia cambrica (Richards)

On decaying fungi (Roháček, 1983, 1984; Pitkin, 1988); decayed *Lactarius* species, *L. piperatus*, various tree fungi (many records, Roháček, pers. comm.); on *Meripilus giganteus*, Ireland, Wicklow, Avondale Forest Park, 4.x.1980 (P.J.C.).

Spelobia clunipes (Meigen)

Rarely on fungi (Haliday, 1836; Roháček, 1983; cited by Pitkin, 1988); on fungus (Richards, 1930); traps baited with decayed fungus (Marshall & Brown, 1984).

Ex many agarics and boleti (Canzanelli, 1941, refers to rearings by Dufour under the name *lugubris* Dufour nec Zetterstedt; this is more likely to refer to *parapusio* (Dahl) as there is no other evidence that the very common species *clunipes* is a fungus feeder).

Spelobia luteilabris (Rondani)†

Ex *Leccinum scabrum* group (Hackman & Meinander, 1979); on *Meripilus giganteus* and *Armillaria mellea* (P.J.C.).

Spelobia palmata (Richards)

Sometimes on fungi (Richards, 1930; probably a misidentification according to Pitkin (pers. comm.) as there are no specimens of *palmata* in Richards's collection); decayed fungi (Roháček, 1983); tree fungus (Coe, 1962); decayed *Lactarius*, *Lentinus*, *Phallus*, tree fungi (Roháček, pers. comm.).

Spelobia parapusio (Dahl)*

This is the most frequent fungus feeder in the family in Britain; the rarity of males has been noted by Richards (1930), Papp (1972), Roháček (1983) and Pitkin (1988). Okely (1974) found that it could be parthenogenetic and she reared no males from her cultures. However, I have found males visiting *Meripilus* and *Hypholoma* and have reared both sexes in smaller proportions from *Pholiota* and *Russula*, so further study to establish the conditions influencing parthenogenesis is required. On fungi (Séguy, 1934; Duda, 1938; Papp, 1973; Roháček 1983); abundantly reared from fungi (Richards, 1930); ex decaying fungi (Canzanelli, 1941); ex *Phallus* (Smith, 1956); ex *Russula ochroleuca* (Buxton, 1960); ex nine species of fungi (Papp, 1972); on *Pleurotus cornucopiae* (Chandler, 1973); ex fungi (Okely, 1974); ex *Russula*, *Gyromitra* (Papp, 1979); ex *Leccinum scabrum* group, *Gomphidius roseus*, *Tricholoma album*, *Amanita rubescens*, *Agaricus campestris*, *Cortinarius triumphans*, *Russula flava*, *Lactarius trivialis*, *L. rufus* (Hackman & Meinander, 1979); ex *Russula ochroleuca* (Kuznetzova, 1986); ex *Russula emetica*, *Pholiota squarrosa* and adults on *Armillaria mellea*, *Mycena* species, *Pleurotus ostreatus* (three localities), *Meripilus giganteus*, rotten *Polyporus squamosus* and rotten *Hypholoma fasciculare* (P.J.C.).

Spelobia rufilabris (Stenhammar)

On *Meripilus giganteus* (P.J.C.).

Telomerina flavipes (Meigen)†

On fungi (Papp, 1973); ex fungi (Duda, 1938); ex *Boletus edulis* (Bonnamour, 1926, as *minutissima* Zetterstedt); ex *Coprinus atramentarius* (Papp, 1972); on decaying tree fungi and *Lactarius piperatus* (Roháček, pers. comm.).

Telomerina pseudoleucoptera (Duda)

On decaying fungi (Roháček, 1984).

Terrilimosina schmitzi (Duda)†

Ex *Ramaria*, *Lactarius*, *Leccinum* (Papp, 1979); male on *Pleurotus* on an elm stump, Surrey, Runnymede, 10.viii.1985 (P.J.C.).

Trachyopella coprina (Duda)

Rotting toadstools (Pitkin, 1988).

Trachyopella lineafrons (Spuler)

Rarely on rotting fungi (Roháček & Marshall, 1986).

Trachyopella melania (Haliday)

Male on *Agaricus* species, Bucks, Old Slade, woods, 3.vii.1977 (P.J.C.).

Xenolimosina setaria (Villeneuve)

On fungi in Hereford (Richards, 1930); on *Hypholoma fasciculare* (Duda, 1938; decaying fungi (Pitkin, 1988); male on rotting *Meripilus giganteus*, Kent, Chislehurst, Pond Wood, 28.x.1973 (P.J.C.).

Other habitat associations

Apteromyia claviventris (Strobl)

Adults were found in bird's nests and a squirrel's drey at Leckford, Hants., iii.1972 (P.J.C.).

Coproica pusio (Zetterstedt)

Male on a dead fox, Kent, Leaves Green, 14.ii.1971 (P.J.C.). New record for Kent.

Leptocera caenosa Rondani

I have found this species in wet decomposing materials in flour mills and bakeries in Essex, Bucks, Northants and Northern Ireland, Belfast, mainly indoors but it can be numerous outside in drainage systems conveying warm effluent. I also have outdoor records from Hook Farm, Bromley, Kent, 6.i.1964, on decomposing vegetables and from Burnham Beeches, Bucks, 1.vii.1967 (P.J.C.). New record for Northants.

Minilimosina fungicola (Haliday)

Two males on damp bonfire ash with *Trachyopella melania* (Haliday) (q.v.), Kent, Cuckoo Wood, 23.vii.1972 (P.J.C.).

Spelobia cambrica (Richards)

Both sexes were found on a dead sheep at Kenna Craig, Argyllshire, 11.vii.1974 (P.J.C.). New record for Argyll.

Telomerina flavipes (Meigen)

Males have been found on a dead rabbit in Durham, on a dead sheep on sand dunes in Sutherland and in decomposing waste material at a bakery in Basildon, Essex, 14.ix.1986 (P.J.C.). New record for Essex.

Telomerina pseudoleucoptera (Duda)

Both sexes were reared from cow dung at Leckford, Hants., 2.x.1971, adults emerging 10–12.xii.1971 (P.J.C.). New record for Hants.

Trachyopella lineafrons (Spuler)

A male was found in a drain conveying effluent from a factory at Corby, Northants., 9.iii.1989 together with numerous *Leptocera caenosa* (P.J.C.). New record for Northants.

Trachyopella melania (Haliday)

Both sexes were found on damp bonfire ashes at Cuckoo Wood, Kent, 23.vii.1972 and a female in bonfire smoke at East Tisted, Hants., 28.viii.1972 (P.J.C.). New records for Kent and Hants.

Other new records of the less well known species

Gigalimosina flaviceps (Zetterstedt)

A distinctive species, swept in woods in Scotland (Inverness), Ireland (Wicklow), Bucks, and Kent (P.J.C.). New records for Kent, Bucks and Ireland, Roháček (1980) found it not rare on decayed wet leaves in Czechoslovakia.

Kimosina plumosula (Rondani)

Males from three old woodland localities: Kent, Knole Park, 6.ix.1966, around a fungus encrusted log; Berks., Windsor Forest, 27.vi.1977; Bucks., Cliveden, 3.vii.1984, on log pile (P.J.C.). New records for Berks and Bucks.

Leptocera finalis (Collin)

Male in saltmarsh in Ireland, Sligo, Ballysadare Bay, 13.v.1970 (P.J.C.). New record for Ireland.

Minilimosina v-atrum (Villeneuve)

Seen from several localities in Scotland (Inverness, Ross, Sutherland), and Ireland (Offaly, Kildare), both from woodland and marsh habitats. New records for Ross, Sutherland and Ireland.

Opacifrons septentrionalis Stenhammar

Both sexes from the banks of the Spey at Aviemore, Inverness, 13.vi.1982 (P.J.C.).

Spelobia talparum (Richards)

Male on sand dunes at Strathy Bay, Sutherland, 2.viii.1972 (P.J.C.). New record for Sutherland.

Terrilimosina schmitzi (Duda)

Male from Hants., Brockenhurst, by the Oberwater stream, 4.vi.1982 (P.J.C.). New record for Hants.

Xenolimosina setaria (Villeneuve)

Female from Kent, Knole Park, 12.xi.1967 (P.J.C.). New record for Kent.

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1989 ANNUAL EXHIBITION
Imperial College, London SW7 — 28 October 1989

The major event of the Society's calender was once again a splendid success. 275 people signed the visitor's book, and 152 exhibits graced the long tables of the Sherfield Room. The following account of exhibits has been compiled by R.D.G. Barrington (British butterflies), B.F. Skinner (British Macrolepidoptera), J.M. Chlalmers-Hunt (British Microlopidoptera), B. Goater (Foreign Lepidoptera), P.J. Chandler (Diptera), R.A. Jones (Coleoptera and Hemiptera), A.J. Halstead (Hymenoptera and other orders) and E.S. Bradford (Illustrations). Andrew Halstead also acted as the Society's Exhibition Organizer, and the occasion was made such a smooth success through his hard work.

After the exhibits had been cleared away, members and guests sat down to the Annual Dinner.

The 1990 Annual Exhibition will take place at Imperial College on Saturday 27 October 1990.

British Butterflies

The best summer for 13 years allowed many species to undergo good population increases and the long summer was reflected in the number of exhibits on show, although there were perhaps fewer wild-caught aberrations than might have been expected in such a year. Several interesting exhibits illustrated the results of breeding from aberrant forms, two of which were of outstanding quality, and our members continue to experiment, with considerable success, on temperature-induced aberrations.

Bailey, K.E.J. — Further results from this exhibitor's very extensive experiments on temperature shock treatment of early pupal nymphalids. The major finding has been that the response to shocking the pupa with heat or cold is enhanced by giving temperature or photoperiod shocks to the pre-pupal larva. The precise mechanism of pigment formation and deposition on the developing wings that is affected by shock treatment is not entirely understood, but these results suggest that it starts a few days prior to pupation.

A range of extreme aberrations were shown, including a very striking *Nymphalis antiopa* L. ab. *hygiaea* Heyd. with the yellow border suffused halfway across all wings (final instar larva changed to short photoperiod, then pupa heat-shocked), *Argynnis paphia* L. ab. *ater*, a heavily melanic insect (treatment as with *antiopa* but pupa cold-shocked), *Cynthia cardui* L. ab. *elymi*, several very extreme forms (larva given 2–3 days cold stress at 5°C then pupa cold-shocked). Other species included *Nymphalis indica vulcania*, a new aberration with greatly extended red bands, *Vanessa atalanta* L. ab. *klemensiewiczi* Schille. *Nymphalis polychloros* L. ab. *testudo* Esp., *Aglais urticae* L. ab. *semiichneusoides* Pronin, a confluent *Issoria lathonia* L. and *Mellicta athalia* Rott. ab. *corythallia* Hübn.

The results from these inventive experiments are of considerable importance in our understanding of the processes of pigment formation and deposition.

Barrington, R.D.G. — Aberrations caught and bred in North Dorset in 1989. (a) *Maniola jurtina* L. a female ab. *fracta* Zweiglt bred in the F_1 from a transitional female. The F_1 produced an indeterminate range of type through to *fracta*. One male and two female *postmultifidus* Lipscomb also bred in F_1 from a transitional *postmultifidus* parent. One female was an extreme ab. *antiaurolancea* Leeds with the upperside fulvous reduced to a thick ring around the apical spot. As with *fracta* the F_1

generation showed a range of insects from type to *postmultifidus*. F_2 generations will be needed to determine the precise mode of inheritance.

(b) *Maniola jurtina* L. aberrations captured in North Dorset, including, from a hay meadow, females ab. *crassipuncta* — *excessa* Leeds, *fracta* Zweiglt, *antiobscura* Leeds, a pair of *atrescens* Leeds, an example with a black patch on the underside of one hindwing (partial expression of *atrescens*), and two homoeotic examples, one with brown and the other with orange streaks on the underside of one hindwing. From a North Dorset woodland, a male *subtus-albida* Leeds and a female with much of the underside of one forewing streaked with pale scaling, probably a homoeotic form.

(c) *Argynnis paphia* L. an extreme male ab. *nigricans* Cosm. heavily suffused and rayed with black, and *Lysandra coridon* Poda male ab. *alba* — *radiata* B.&L. These two were captured within a week and were almost certainly due to the high summer temperatures.

(d) *Lycaena phlaeas* L. ab. *extensa* Tutt and ab. *cuprinus* Peyer. *Pieris rapae* L. a male with a thick streak of black scales in the discal cell of the underside of the forewings.

Beccaloni, G.W. — An attractive female *Melitaea cinxia* L. ab. *horvathi* Aigner, bred May 1989 from wild stock.

Callow, M. — A very fine *Aricia agestis* F. ab. *deleta* Ckll. with the hindwings obsolete and the ground colour white. An insect of great rarity. A good pair of *Lysandra coridon* Poda ab. *cinnameus* B.&L. taken in 1988 and 1989. All from Surrey.

Craske, R.M. — A male *Celastrina argiolus* L. ab. *paucipuncta* Courv. bred from wild larvae in September 1989. This species had a tremendously successful year and larvae were abundant in late summer.

Dennis, R.C. — *Aricia agestis* F. aberrations including two specimens with reduced spotting, one affecting the hindwings only, the other with spots missing on all wings. Ab. *snelleni* Ter Harr with the discoidal spot on the upperside of the forewings circled with white. These aberrations were from a colony in East Sussex. *Aricia artaxerxes* ssp. *salmacis* Steph. from north-west England. The exhibitor records that the colonies of this subspecies tend to be of very small size (10–15 individuals) compared with the above colony of *agestis* which numbers up to 100 individuals. Five obsolete forms were shown (this aberration is much more frequent in *artaxerxes* than *agestis*) four of which were taken in 1988 when the conditions were unusually dry and sunny.

Harmer, A.S. — A good *Erynnis tages* L. ab. *suffusa-variegata* Tutt — a very pale form. Various forms of *Lycaena phlaeas* L. another species to benefit from the long summer — a male *ultraeleus* Leeds with heavily suffused forewings, ab. *extensa* Tutt, *remota* Tutt and several showing reduced hindwing bands (transitional to *obsoleta* Tutt). *Hipparchia semele* L. — a strongly marked female ab. *macrocellata* Lempke and a female ab. *thyone* Schultz with reduced forewing spots. *Plebejus argus* L. females of ssp. *caernensis* from Great Orme, some being almost entirely blue, and a male of an unnamed form with orange markings on the margins of all wings on the upperside.

Various extra broods of butterflies, reflecting the hot summer — *Boloria selene* L. (Devon, August 1989), *Pieris brassicae* L. third brood reared by Arran Harmer, aged 7. *Celastrina argiolus* L. — bred third generation specimens. These were of the summer form.

Jones, A.M. — (a) *Parage aegeria* L. — one of two very impressive breeding experiments at the exhibition. From a female ab. *parviocellata* Lempke with reduced

hindwing eye spots an F_1 of 23 specimens was reared, 13 of which (approx. 50%) showed reduced hindwing eye spots. The F_2 of 77 insects must have been a surprise to the exhibitor, 44 were very variable *parviocellata* (some with no hindwing eye spots at all, but the pale surrounds remaining.) and 22 were of a new and striking form with the pale markings between veins 2 and 3, and 3 and 4 of the forewings running together. Seven of the brood showed a combination of the new form and reduced eyespots. *Parviocellata* occurred in approx. 75% of the F_2, suggesting that it is a pure dominant, the original parent being heterozygous. Further breeding, now in progress, should determine the inheritance of the new aberration.

(b) *Maniola jurtina* L. — aberrations captured in Surrey in 1989, including two gynandromorphs, one almost halved, the other with most of the right forewing male, the rest of the insect female. A fine male *grisea — argentacea* Ober., female ab. *fracta* Zweiglt, female transitional to *atrescens* Leeds with black suffused hindwings and a female *radiata* Leeds. *Thecla betulae* L. a male with strong homoeosis on the underside of the left side, showing streaks of upperside colouration. Bred from type, inbred stock.

(c) *Lycaena phlaeas* L. — the results of breeding from ab. *radiata* Tutt, this specimen also having heavy underside hindwing spotting. The F_1 of 132 specimens comprised 58 with heavy spotting on the hindwings, 68 with reduced hindwing copper bands and six ab. *basijuncta* B.&L. The F_2 of 27 insects all had the heavy spotting, five were *basijuncta* and 14 *radiata* (including some good forms). Outcrossing F_2 examples to wild insects gave a brood of 110 specimens, 39 having heavy spotting (with eight *basijuncta* and one *costa juncta* Courv.). *Radiata/obsoleta* (expressions of the same gene) has been shown to be a recessive, so in this experiment the original parent must have mated with a heterozygous specimen to produce aberrations in the F_1.

NASH, S. — *Strymonidia pruni* L. reared from the egg in 1989, from Oxon. stock collected 20 miles from the nearest recorded site for the species. *Colias croceus* Geoff. from Lyme Regis, Dorset, 27.vii.89.

PATEMAN, J. — A very good pair of *Argynnis paphia* L. ab. *ocellata* Frings, four aberrations of *Melitaea cinxia* L. including a female ab. *wittei* Geest. and a male with the central markings of the upperside forewings reduced. *Celastrina argiolus* L., two specimens, one being a summer brood female with very heavy borders, the other a possibly unique female showing the characteristics of ab. *fowleri* South of *Lysandra coridon* Poda on the hindwings. This white margin was also appearing at the bottom of the forewings. *Fowleri* occurs regularly in *coridon*, and a similar from has been recorded in *Plebejus argus* L. A mixed gynandromorph of *Maniola jurtina* L. with female streaks on three wings of a mainly male insect. A series of *Aricia artaxerxes* F. with some good examples of ab. *obsoleta* Tutt, and four bred *Lycaena phlaeas* L., two with the upperside forewing spots moved towards the discoidal, and two undersides showing the *costajuncta* courv. characteristic.

PAYNE, J.H. — Various melanic forms of *Aglais urticae* L. from temperature-shocked pupae, two *Vanessa atalanta* L. ab. *fracta* Tutt and a female *Anthocharis cardamines* L. ab. *lasthenia* Mull. bred from wild ova with the black apical patch almost absent.

PITTIS, REV.S.C. — Examples of *Carterocephalus palaemon* Pallas from Inverness-shire, taken in late May 1989. A female *Aphantopus hyperantus* L. with enlarged eyespots and broad yellow surround approaching ab. *chrysophalaros* Collier and two aberrations with delightful histories. A striking *Inachis io* L. ab. *semi-ocellata* Frohawk handed to the exhibitor by a member of his congregation at the end of a service. The upperside was examined almost as an afterthought before its intended

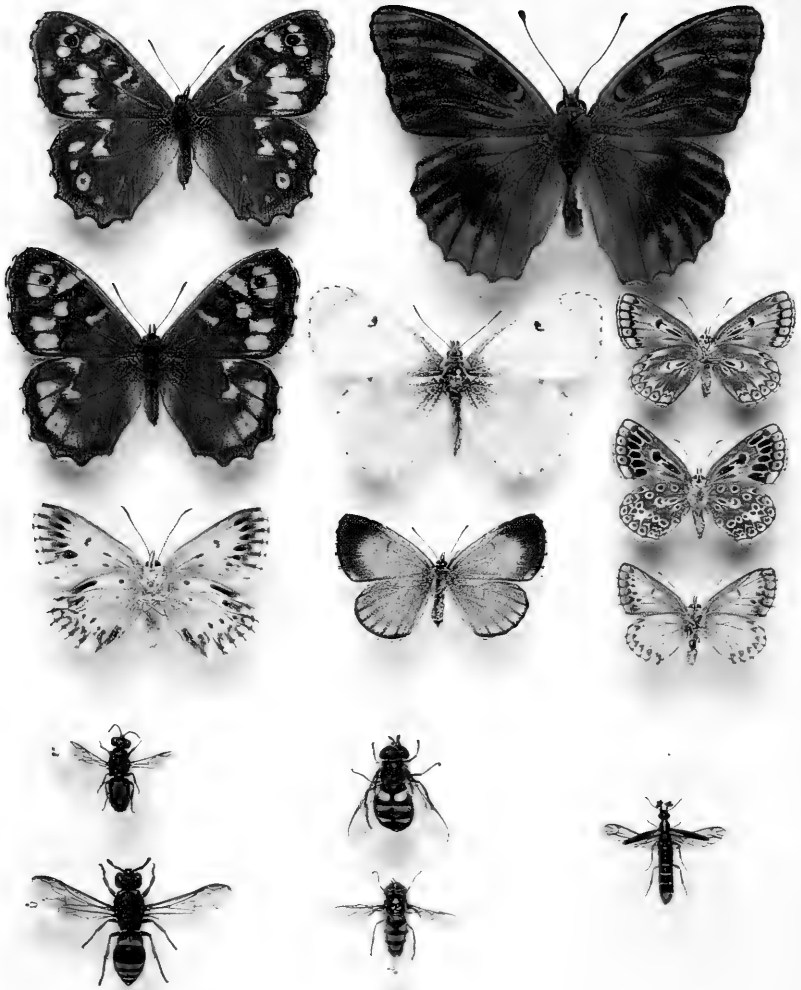

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Plate III. ANNUAL EXHIBITION 1989

1: *Pararge aegeria,* bred, A.M. Jones. 2: *P. aegeria,* bred, A.M. Jones. 3: *Lysandra coridon* ab. *alba-radiata,* Dorset, 1989, R. Barrington. 4: *Argynnis paphia* ab. *nigricans,* Dorset, 1989, R. Barrington. 5: *Anthocharis cardamines,* bred, Northants, J.H. Payne. 6: *Celastrina argiolus* ab. nov, bred, Sussex, J.E. Bateman. 7: *Polyommatus icarus* ab. *basielongata-caeca,* bred, L.D. Young. 8: *P. icarus* ab. *discoelongata/basielongata,* bred, L.D. Young. 9: *Aricia agestis* ab. *deleta,* Surrey, 1986, M. Callow. 10: *Ancistrocerus antilope,* Brownsham, Devon, 17.vi.89, S. Falk. 11: *Chrisis pseudobrevitarsis,* Brownsham, Devon, 17.vi.89, S. Falk. 12: *Didea alneti,* County Durham, 12.vii.89, A.E. Stubbs (col. G. Simpson). 13: *Epistrophe melanostoma,* Banstead Downs, Surrey, 15.v.88, R. Morris. 14: *Lymexylon navale* (male), Ashted Common, Surrey, 18.vi.89, I. Menzies

Photo: D. E. Wilson

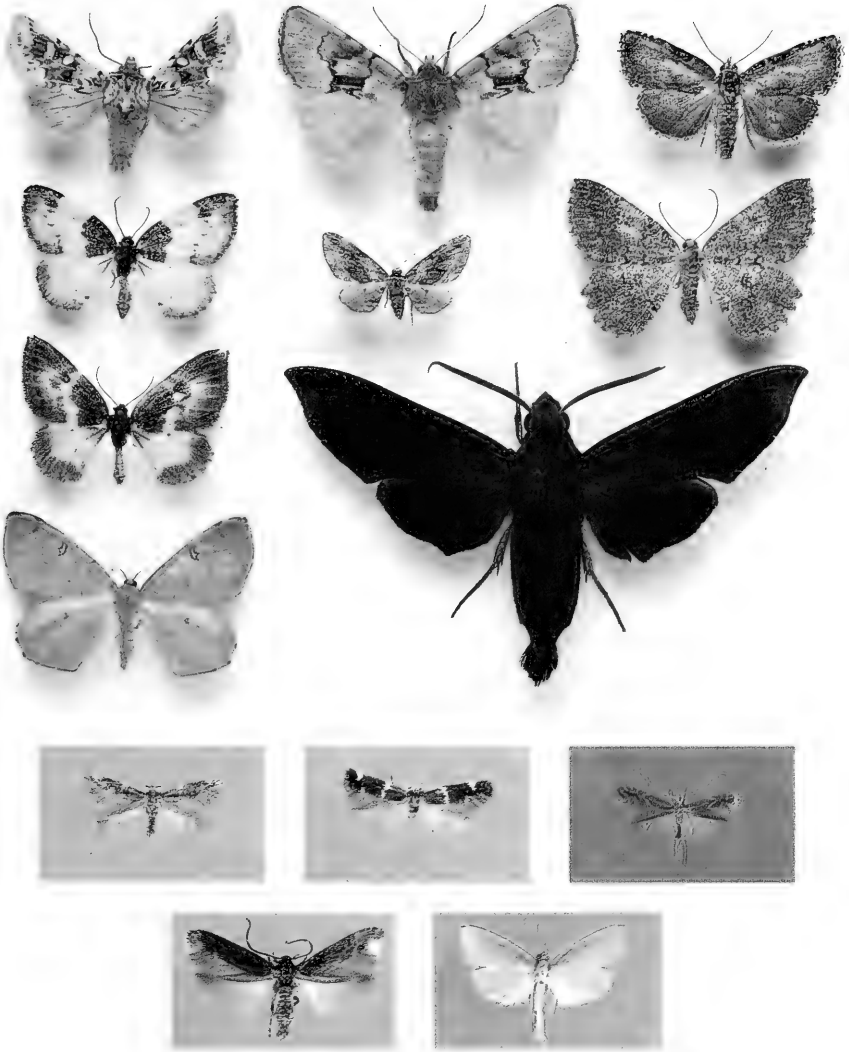

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Plate IV. ANNUAL EXHIBITION 1989

1: *Hadena perplexa*, Greatstone, Kent, 26.vi.89, S.P. Clancy. 2: *Thalpophila matura*, St Ives, Ringwood, Hants, J. Clarke. 3: *Cryphia muralis*, Shaldon, Devon, 23.viii.89, S.C. Pittis. 4 & 5. *Mesoleuca albicilliata*, bred, 14 & 20.v.89, A.R. Cronin. 6. *Eupithecia phoeniceata*, Brockenhurst, 24.ix.89, H.G.M. Middleton. 7. *Gnophus obscuratus*, A.S. Harmer. 8. *Opisthograptis luteolata*, Tolworth, Surrey, 2.ix.85, J.T. Scanes. 9. New species of hawkmoth (*Eurypteryx geoffreyi*), Khoa Yai National Park, Thailand, 9.iv.88, T.W. Harman. 10 & 11. Light and dark forms of *Elachista albifrontella*, M Young and M. Harper. 12. *Phyllonorycter leucographella*, bred, Essex, 1–3.iv.89, A.M Emmet. 13. *Mompha subdivisella*, bred, Oxford, 1988, P.H. Sterling and J.R. Langmaid. 14. *Sclerocona acutellus*, Leckford, Hants, 8/9.vi.88, M.J., P.H. and D.H. Sterling. (Figures 10 to 13 approx twice life size.)

Photo: D. E. Wilson

The cost of reproducing colour plates I to IV has been met by a grant from the Hammond and Crow Memorial Fund.

release. A perfect halved gynandromorph of *Maniola jurtina* captured by the exhibitors 4-year-old son who had spent some time trying to capture 'a butterfly'. When he succeeded, he insisted that his father box the specimen and examine it — to his consequent surprise!

ROBERTSON, T.S. — A series of *Lycaena phlaeas* L. bred in the F_1 from a captured parent (Berks.) with a reduced hindwing copper band. Twenty of this F_1 had almost or quite obsolete bands (*obsoleta* Tutt), and others had somewhat reduced bands. As with A.M. Jones's exhibit, the recessive *obsoleta* appeared in the F_1 and the same remarks would apply. As this is not a rare form it is quite possible that an aberration might pair with a heterozygote.

RUSSWURM, A.D.A. AND MIDDLETON, H.G.M. — An unusual *Vanessa atalanta* L. ab. *reducta* bred from Brockenhurst with three of the five white spots on the forewings absent. Two striking melanic forms of *Nymphalis polychloros* L. ab. *testudo* Esp. which were aberrant mainly on the forewings, one having the twin discal spots absent, both from heat-shocked pupae.

SALMON, M.A. — (a) Specimens taken in 1988–9. Dwarf forms of *Lysandra coridon* Poda and *L. bellargus* Rott., *Cynthia cardui* L. with symmetrical white patches on the forewings and an excellent albino *Pieris brassicae* L. ab. *albinensis* Gardiner — a very great rarity in the wild, although since its appearance along with the blue ab. *coerulea* Gardiner in B.O.C. Gardiner's Cambridge stock (in-bred for 80 generations) it has been extensively bred in captivity and is a recessive form. *Aphantopus hyperantus* L. with most scales absent from the left forewing, *Pyronia tithonus* L., a strongly marked ab. *excessa* Leeds from Devon, where some of the best forms of this aberration have been taken in the past, and *Colias alfacariensis* Berger from Dancer's Head in Bucks.

(b) Various aberrations from old collections including a remarkable series of *Lysandra bellargus* Rott. showing variation of the male upperside coloration from ab. *pallida* Mosley of a whitish blue through various suffused forms to very extreme specimens of ab. *suffusa* Tutt with dark grey suffusion totally obliterating the blue scaling. The original specimen of the striking *Strymonidia w-album* L. ab. *albo-virgata* Knoch, taken near Ipswich in 1859 and figured in E. Newman's *Natural history of British butterflies*. A specimen acquired at the same sale was ab. *suffusa* (taken by H.A. Leeds in 1933) with the orange marginal band replaced with chocolate brown coloration.

Maniola jurtina L. ab. *alba* Leeds figured by Frohawk in 1938 with heavy symmetrical bleaching in the centre of all four wings. A range of forms of *Colias croceus* Geoff. mainly showing variation of the black borders, but the best specimen was a superb ab. *purpurascens* Ckll. with the upperside of the hindwings of a deep grey-purple shade (figured in the recent *Moths and butterflies of Great Britain and Ireland*, vol. VII).

STANDING, P.A. — A range of bred *Melitaea cinxia* L. including an ab. *uhryki* Aign. (1989) and an extreme example of the same form bred in 1979 with much of the dark scaling absent from the underside of the hindwings and the orange scaling restricted to the basal area. A series of nine insects showing all stages of ab. *wittei* Geest with three well developed examples.

STOKES, D. — A range of *Inachis io* L. showing reduction of the hindwing eyespot from ab. *semi-ocellata* Frohawk to the blind peacock ab. *belisaria* Ober., from heat-shocked pupae.

SWIFT, S. — *Danaus plexippus* L. from Bury St Edwards, taken 1988 or 1989. This was almost certainly a local escape.

TUBBS, R.S. — A breeding experiment with *Maniola jurtina* L. ab. *pallens* Thiery-

mieg. The original female, taken in Beds. had very pale ground colour. This example was also ab. *bioculata* Rebel., the eyespot having two pupils. Five females obtained in the F_2 were all ab. *biocellata* Lempke with a divided apical spot, but none showed ab. *pallens*. As the brood was very small no significance can be attached to the results. *M. jurtina* is proving to be one of the more difficult species to breed in good numbers.

TREBILCOCK, G.D. — Aberrations from Wilts and Dorset in 1989. An interesting *Erynnis tages* L. taken in August with the black markings streaked in much the same manner as the white-streaked ab. *taras* Berg. in *Pyrgus malvae* L. A good *Hamearis lucina* L. female ab. *gracilens* Derenne with reduced black markings and two *Lysandra bellargus* Rott. showing reduced underside spotting, one being obsolete on the hindwings only, ab. *cinnides* Staud, the other totally obsolete — ab. *krodeli* Gillmer. Various obsolete forms of *Lysandra coridon* Poda and a female ab. *infrasemisyngrapha* Tutt which was *post-caeca* B.&L. on the underside. Two *Argynnis aglaja* L. with heavy central black markings on the upperside of the forewings and a male *Coenonympha pamphilus* L. with a heavy black border to the upperside.

WILTSHIRE, E.P. — A third generation *Celastrina argiolus* L. (a female of the summer form) bred from wild larvae in September 1989. This species showed a strong, natural third brood in some areas in 1989, but it is doubtful if the ivy buds would have lasted long enough to allow the subsequent larvae to grow to maturity.

YOUNG, L.D. — The second exhibit on show illustrating a highly successful breeding programme. This strain of *Polyommatus icarus* Rott. (ab. *antidiscoelongata* B.&L. crossed with *basielongata* B.&L.) has become something of a feature of the exhibition in recent years, and a selection of specimens from the three broods reared in 1989 showed that the continued selective inbreeding has produced more extreme specimens than ever, some with the *discoelongata* character now approaching ab. *radiata* Courv.

Two unusual specimens occurred this year: an outstanding male ab. *alba-radiata* B.&L. and a probably unique female showing the contrasting characteristics of *basielongata* and *caeca* B.&L. It is hoped that the strain can be successfully maintained to ascertain just how far the aberrations can be developed.

BRITISH MACROLEPIDOPTERA

BAKER, B.R. — An unusual variety of *Electrophaes corylata* Thunb. from Porlock, Somerset, on 23.vi.89; and some forms of *Agrotis clavis* Hufn. from Berkshire.

BECCALONI, G.W. — A selection of the forms of *Angerona prunaria* L. obtained from cross-paring f. *corylaria* Thunb. with ab. *aureocincta* Ob. The exhibit included data of the proportions of the phenotypes obtained and the probable genetics of the offspring.

BRITTON, M.R. — A selection of species taken in Yorkshire in 1989 included bred *Chloroclystis chloerata* Mab. from Duncombe Park, Helmsley; and a specimen of *Eilema deplana* Esp. from Hagg Wood, Dunnington, on 25.vii.89.

CLANCEY, S.P. — From Wallington, Surrey a gynandromorph *Agrotis exclamationis* L. on 17.vi.80. From Folkestone Warren, Kent, examples of *Standfussiana lucernea* L., *Apamea furva* D. & S., *Scopula nigropunctata* Hufn. and *Aspitates gilvaria* D. & S. on 13.vii.89. From Dungeness, Kent, single specimens of *Polia trimaculosa* Esp. (*hepatica* auctt.) on 11.vi.89, *Ennomos autumnaria* Werneb. on 4.ix.89, *Semiothisa wauaria* L. on 13.vi.89, *Hyles gallii* Rott. on 6.viii.87, an extreme aberration of *Hadena perplexa* D. & S. on 16.v.89 and a gynandromorph *Noctua pronuba* L. on 20.viii.87. From Greatstone, Kent, *Actebia praecox* L. on 17.viii.88,

Parascotia fuliginaria L. on 8.viii.87, *Xestia agathina* Dup. on 29.viii.89, *Eilema caniola* Hübn. on 24.viii.84, *Mythimna loreyi* Dup. on 23.x.88, *Senta flammea* Curt. on 1.vi.87, *Cyclophora puppillaria* Hübn. on 24.x.88, *Deltote bankiana* F. on 7.vii.89 and *Scopula rubiginata* Hufn. on 17.viii.89.

CLARKE, DR J. — Aberrant moths taken in 1988 and 1989 included a striking *Thalpophila matura* Hufn. and a very pale form of *Peribatodes rhomboidaria* D. & S. Other exhibits were a series of *Gnophus obscurata* D. & S. from a Dorest heath which interestingly were attracted to actinic light and not to normal m.v.l., and the fourth British mainland specimen of *Thera cupressata* Gey, taken at St Ives, Hants., on 24.x.88.

CLASSEY, E.W. — A selection of interesting aberrations taken at Uffington, Oxon, including a melanic speciman of *Ecliptopera silaceata* D. & S. and an almost obsolete *Spilosoma lubricipeda* L.

COOK, R.R. — Local species taken in 1989 included *Hydriomena ruberata* Frey. from Dorset and *Pelosia obtusa* H.-S. from Norfolk.

CORLEY, M.F.W. — Aberrant Lepidoptera collected in Oxfordshire in 1989 included *Mesoligea literosa* Haw. f. *aethalodes* Rich. from Faringdon on 24.vii. and a dark form of *Eilema deplana* Esp. from Bagley Wood on 21.vii.

CRONIN, A. — Aberrant moths taken at Portslade, Sussex, included a bred series of *Mesoleuca albicillata* L. showing several extreme dark and pale varieties.

EMMET, LT. COL. A.M. — The second Essex record of *Photedes fluxa* Hubn. and the first from VC19 taken at Saffron Walden on 25.vii.89, two examples of *Hemistola chrysoprasaria* Esp. from Saffron Walden on 6 and 21.ix.89 probably second brood specimens of a normally single brooded species, and a specimen of *Plusia festucae* L. from Saffron Walden on 5.viii.89, a usually rare species in Essex.

HALL, N.M. — Lepidoptera taken or bred during 1989 included a bred series of *Orthonama obstipata* F. bred from a female taken at Portland, Dorset, on 28.x.88, a bred series of *Cleora cinctaria* D. & S. from Great Ovens Hill, Dorset, a male and female of *Euxoa obelisca* Tutt from Eastbourne, Sussex, and from Holt Forest, Dorset, specimens of *Hydriomena ruberata* Frey., *Euphyia biangulata* Haw. and *Meganola strigula* D. & S.

HARMER, A.S. — A female *Gnophus obscurata* D. & S. having the area from the outer median band to the border of all wings dark grey broken only by white veining producing a rayed effect.

HAYWARD, R. — A selection of Macrolepidoptera taken or bred in the last few years included from the exhibitor's garden in Slough, Berks, a bred series of *Hadena compta* D. & S. and an example of *Mythimna straminea* Treit. taken in July 1986.

HECKFORD, R.J. — A dark form of *Hylaea fasciaria* L. from Plympton, Devon, on 20.vi.89, a diminutive *Noctua pronuba* L. from St Marys, Isles of Scilly, on 22.viii.89 and a specimen of *Mythimna loreyi* Dup. from Brixham, Devon, on 29.vii.89.

HENWOOD, B. — A very small example of *Alcis repandata* L. with a wingspan of 35 mm from Seaton, Devon, on 12.vi.89 and a female *Hypena obsitalis* Hübn from Brixham, Devon, on 29.vii.89.

HIGGS, G.E. — A selection of moths taken in Guernsey from 21.v.89–3.vi.89 included specimens of *Bembecia muscaeformis* Esp., *Cepphis advenaria* Hübn., *Hadena luteago* D. & S. and *Cucullia lychnitis* Ramb.

JENKINS, A. — Migrant and aberrant species taken in 1989 included *Cymatophorima diluta hartwiegi* Reis. ab. *nubilata* Rob. from Chiddingfold, Surrey, *Heliothis armigera* Hübn. from Portland, Dorset, on 26.iv.89, *Mythimna unipuncta* Haw. from Portland on 27.ix.89 and *Rhodometra sacraria* L. from Chardstock, Devon, on 7.ix.89.

JEWESS, P.J. — *Opisthograptis luteolata* L. ab. *albescens* Cockerell; exhibited on behalf of Mr J.S. Badmin.

KNILL-JONES, S.A. — A selection of interesting captures from Freshwater, Isle of Wight, in 1989. Of special interest were specimens of *Heliothis armigera* Hübn. on 25.ix., *Rhodometra sacraria* L. on 19.x., four *Mythimna albipuncta* D. & S. from 4.ix.–23.x., ten *M. unipuncta* Haw. from 25.ix.–13.x. and a second brood specimen of *Ourapteryx sambucaria* L. on 24.x.

MCCORMICK, R.F. — A melanic *Idaea aversata* L. taken at Ashstead, Surrey, on 6.vii.89.

MIDDLETON, H.G.M. — A selection of mainly aberrant moths taken at Brockenhurst, Hants; of special interest were two specimens of *Eupithecia venosata* F. being the first records of this species from the area in 30 years of light trapping; and an unusual aberration of *E. phoeniceata* Ramb.

NASH, S. — From Fernham, Oxon, *Xylena exsoleta* L. on 29.iii.89, *Spodoptera exigua* Hübn. on 25.vii.89, *Orthonama obstipata* F. on 16.vi.89, *Rhodometra sacraria* L. (11 noted between 22.vii. and 26.x.89, *Macroglossum stellatarum* L. on 26.ix.89, *Arenostola phragmitidis* Hübn. on 2.viii.89. From Portland, Dorset, *Idaea vulpinaria atrosignaria* Lempke on 6.vii.89 and from Stroud, Gloucestershire, *Setina irrorella* L. on 24.vi.89.

PARSONS, M. — Local and migrant species noted in 1989 included *Aleucis distinctata* H.-S. taken near Preston St Mary, Suffolk on 8.iv., *Simyra albovenosa* Goeze from Dungeness, Kent, on 24.vii., *Heliothis armigera* Hübn. from Ninfield, Sussex, on 23.ix. and *Mythimna albipuncta* D. & S. from East Sussex, on 26.ix.

PENNEY, C.C. AND MCCORMICK, R.F. — Moths taken on a collecting trip to Norfolk from 26.vii–5.viii.89 included single examples of *Xanthorhoe biriviata* Borkh. from Horning on 22.vii. and *Scopula rubiginata* Hufn. from Horsey Dunes on 23.vii.

PHILLIPS, J. AND COOK, R.R. — Larvae of *Mythimna unipuncta* Haw. bred from a female taken at Portland, Dorset, on 24.ix.89.

PICKLES, A.J. AND C.T. — Lepidoptera taken or bred mainly in 1989 included *Cyclophora linearia* Hübn. ab. *fasciata* Prout from Lyndhurst, Hants., *Elaphria venustula* Hübn. also from Lyndhurst, an almost uncolorous pale brown specimen of *Colocasia coryli* L. from Winchester, Hants. and a short series of *Scotopteryx mucronata umbrifera* Heyd. bred from larvae collected in Somerset in November 1988.

PITTIS, REV. S.C. — A selection of local and migrant species mainly bred in 1989. Highlights of the exhibit was an extreme variety of *Cryphia muralis* Forst. found resting on a wall at Shaldon, Devon, on 23.viii.89 and *Trachea atriplicis* L. taken at light at Woking, Surrey, on 5.vii.89.

PLATTS, J. — A series of *Luperina nickerlii nickerlii* Frey. bred from larvae and pupae from Borrer's saltmarsh-grass (*Puccinellia fasciculata* (Torr.) Bicknell) at Faversham, Kent in July 1989. From the same locality were examples of *Hydraecia micacia* Esp. bred from larvae and pupae from dock (*Rumex* spp.).

PRATT, C. — Single specimens of *Tetheella fluctuosa* Hübn. having a transverse black band at the antemedian fascia taken at Ashdown Forest, Sussex on 11.vi.89, and *Agrotis exclamationis* L. having the normal ground-colour confined to the lower half of the left hand side of the forewing with the remainder of the left hand wing and the whole of the right hand wing having a yellowish-cream ground-colour.

SCANES, J.T. — A selection of moths taken in the Wye Valley and Forest of Dean between 19 and 24.vi.89 included *Sabre harpagula* Esp., *Eupithecia egenaria* H.-S.,

Atolmis rubricollis L. and *Euphyia biangulata* Haw. Among aberrations taken at Tolworth, Surrey, was a striking form of *Opisthograptis luteolata* L.

SKINNER, B. — Moths taken or bred during 1989 included a short series of melanic *Ematurga atomaria* L. from Yorkshire, two specimens of *Heliothis viraplaca* Hufn. from Tilshead, Wilts., on 27.vii., single examples of *Enargia paleacea* Esp. from Broxbourne, Herts, on 24.viii., *Hippotion celerio* L. from Swanage, Dorset, on 26.ix., and *Melanthia procellata* D. & S. ab. *nigrapicata* Cockayne from Snodland, Kent, on 10.vii. A photograph of the larva of *Thera cupressata* Gey. received from Dr P. Costen of Guernsey together with two male examples of the adult taken at Swanage, Dorset, on 9 and 18.x.

STERLING, P.H. — A small specimen of *Xanthorhoe fluctuata* L. which has the central band reduced to a black spot, taken at Oxford on 4.ix.89.

WEDD, D. — A wide variety of species taken or bred from the Burren, Cos Clare/ Galway in late July and early August 1989. Of special interest were specimens of an unusually dark race of *Archanara algae* Esp., the pale form of *Perizoma minorata* Treit., a semi-albino specimen of *Eupithecia distinctaria constricta* Guen., specimens of *Cryphia muralis* Forst and a bred series of *Plusia festucae* L. bred from a female found ovipositing on meadowsweet (*Filipendula ulmaria* L.) and reared on the same plant. From elsewhere were a series of *Noctua comes* Hübn. from the Island of Lundy, showing the wide variation achieved after nine generations, and a second brood specimen of *Hemaris fuciformis* L. taken at Marlow, Bucks, in August 1989.

WINTER, P.Q. — Local or migrant Lepidoptera taken or bred in south-east Yorkshire included two bred specimens of *Amphipoea fucosa paludis* Tutt bred from the egg on cock's-foot grass (*Dactylis glomerata* L.), three *Hyles gallii* Rott. bred from a female taken on 7.vii.89, a pair of *Orthonama obstipata* F. bred from a female taken at Muston on 23.x.88, a possibly immigrant example of *Euproctis chrysorrhoea* L. from Flamborough on 8.vii.89 and the first *Agriopis leucophaearia* D. & S. taken in over 25 years of continuous trapping at Muston. A selection taken at Swanage, Dorset, on the 20th & 21st September included the following migrants; *Rhodometra sacraria* L., *Mythimna loreyi* Dup. and *M. albipuncta* D. & S.

WILD, E.H. — A specimen of *Orthosia stabilis* D. & S. showing pronounced melanism.

YOUNG, D. — Two examples of *Opisthograptis luteolata* L. ab. *ruficosta* Lempke from Northants and Hampshire, a late example of *Idaea degeneraria* Hübn. from Portland, Dorset, on 12.ix.89, two bred specimens of *Heliothis maritima warneckei* Bours. from Chobham Common, Surrey, and single examples of *Mythimna unipuncta* Haw. from Studland, Dorset, on 11.ix.89 and *M. l-album* L. from Dungeness, Kent, on 23.ix.89.

YOUNG, DR M.R. — Unusual forms and varieties of Scottish Macrolepidoptera included paler and more variegated specimens of *Perizoma bifaciata* Haw, from the Isle of Barra, a bilateral gynandromorph of *Diarsia mendica* F. from Wester Ross, a melanic *Zygaena purpuralis* Brunn. from the Isle of Canna and a darkly suffused example of *Scotopterix luridata plumbaria* F. from Aberdeenshire.

BRITISH MICROLEPIDOPTERA

AGASSIZ, REV. D. — Sprigs of *Pyracantha coccinea* (Roem) containing mines of *Phyllonorycta leucographella* Zell., collected in Grays, Essex 29.x.1989. This species discovered this year appears to be continuously brooded, mines of all sizes can be seen, and an adult was taken also this morning (29.x.89) by R.J. Heckford.

BAKER, B.R. — Micros taken or bred from Berkshire VC22 in 1989: *Eriocrania*

chrysolepidella Zell., Unhill Wood, 23.iv.89, two females in the area where mines were noted last year. *Coleophora alnifoliae* Bar., Mortimer West End, 20.v.89, a specimen bred from a case found on *Alnus* on 15.vi.88. *Elachista biatomella* Stt., Chawridge Bank. N.R., 17.v.89, 19.vii.89. *Agonopterix nervosa* Haw., Chawridge Bank N.R., 17,18.vi.89 bred from *Genista tinctoria* L. *Anarsia spartiella* Schr., Chawridge Bank N.R., 11.vi.89, bred from *Genista tinctoria* L. *Sorhagenia lophyrella* Doug., Unhill Wood, 9–14,vi.89, bred from spinnings on *Rhamnus catharticus* L. collected 17.v.89; new to VC22. *Cydia compositella* F., Near Enborne, 20.vii.89. *Dichrorampha sylvicolana* Hein., Near Enborne, 16.vii and 3.viii.89, amongst *Achillea ptarmica* L.; new to VC22. *Platyptilia pallidactyla* Haw., Near Enborne, 20.vii.89 amongst *Achillea ptarmica* L.

Bland, Dr K.P. — *Aristotelia ericinella* Zell., Westmuir Common (O.S. Grid N03652), Angus (VC90), 15.vii.89; *new* to Scotland. *Coleophora spissicornis* Haw., Castlecraig (O.S. Grid NT1344), Peebleshire (VC78), at light 13.vi.89; new to VC78. *Caloptilia leucapenella* Steph., Ross Wood (O.S. Grid NS3795), Stirlingshire (VC86), 2.ix.89; new to VC86. *Nemophora minimella* D. & S., Westmuir Common (O.S. Grid NO3652), Angus (VC90), 15.vii.89; new to VC90. *Cydia lunulana* D. & S., Glen Fender Meadows (O.S. Grid NN8967), East Perth (VC89), 18.vi.89. *Ancylis tineana* Hubn., Schiehallion (O.S. Grid NN7157), Mid Perths. (VC88), 24.vi.89; Glen Fender (O.S. Grid NN8967), East Perths. 18.vi.89; new to VC89. *Argyresthia glaucinella* Zell., by the River Shin (O.S. Grid NH5798), East Sutherland (VC107), moth emerged 30.v.89 from workings in the bark of old birch trees collected 13.v.89; workings were common in the area.* On behalf of Martin Robinson)rspb warden, Tulloch Hill Res).: *Rhigignostis incarnatella* Steud., Balrobbie Farm (O.S. Grid NN9062), Mid Perthshire (VC88), 19.v.89; new to VC88.

Chalmers-Hunt, J.M. — *Cydia medicaginis* Kuznetzov, a short series taken 3.vii.89 at Grays, Essex, where it was discovered by the Rev. D. Agassiz. *Celypha contaminella* Hübn., three distinct forms: (1) pale form, sandy coloured, Portland, Dorset; (2) reddish-fuscous form; (3) blackish form, ab. *sticheli* Const. the latter two from Sizewell, Suffolk, 5.viii.89. *Sciota adelphella* F.v.R., five examples from Kent and one from Suffolk of this recently recognized British species, of which the first was taken by the exhibitor in Orlestone Forest, Kent in 1948; also, a single example of the closely related but relatively scarce *S. hostilis* Steph. from the same locality.

Chambers, D.A. — *Euchromius ocellea* Haw., East Malling, Kent, at m.v.l., 26.ix.89. *Ectomyelois ceratoniae* Zell., reared from a larva feeding on a walnut in a packet of mixed fruit bought at a Kent supermarket.

Clancy, S.P. — The few micros included in this exhibit comprised specimens of *Stenodes alternana* Steph., 2.viii.88, *Pempeliella ornatella* D. & S., 2.viii.88 & 13.vii.89, *Pempelia obductella* Zell., 3.viii.89; all from Folkestone Warren, Kent. *Palpita unionalis* Hübn., 25.x.88, *Lozotaeniodes formosanus* Gey., 9.viii.88, *Acleris permutana* Dup., 20.vii.88, 14.vii.89; all from Dungeness. *Dioryctria abietella* D. & S., 8.vii.89, *L. formosanus* 2.viii.88, *Melissoblaptes zelleri* Joannis, 24.vi.88, *Nyctegretis lineana* Scop., 3.viii.88; all from Greatstone, Kent.

Clarke, Dr J. — The following interesting pyraloid: *Euchromius ocellea* (L.) at m.v. light, St Ives, Ringwood, Hants., 12.xi.88.

Corley, M.F.V. — (a) Species from Oxfordshire: Swyncombe Downs, *Scythris*

* Oak or horse-chestnut bark are the normal pabula of *A. glaucinella*, and the species has not been recorded previously on birch to my knowledge — J.M.C.H.

fletcherella Meyr., reared 13.vii.89; Cumnor Hurst, *Coleophora trigeminella* Fuchs, 20.vi.89; Cumnor Hurst, *C. flavipennella* Dup. (grey-brown form), 20.vi.89. Cumnor, *Blastobasis decolorella* Wollaston, 20.vi.89; Faringdon, *Stenodes straminea* Haw., 24.vii.89; *C. coracipennella* Hübn., reared from sloe, 26.vi.89; *Scrobipalpa atriplicella* F.v.R., vii.89; *Eucosma pupillana* Clerck, 17.vii.89; *Yponomeuta rorrella* Hübn., 24.vii.89. (b) Species from Berkshire: Newbury, *C. solitariella* Zell., reared 15.vi.89; Dry Sandford, *Cosmopterix zieglerella* Hübn., reared from mine collected 4.viii.89, emerged 12.ix.89; Lambourne, *Agonopterix bipunctosa* Curt., reared 23.vi.89; Goring, *Telephila schmidtiellus* Heyd., 9.vii.89; *Cochylis flaviciliana* West., 9.vii.89; *Pammene albuginana* Guen., 19.v.89; *Stenoptilia zophodactyla* Dup., 7.ix.89; *Pterophorus baliodactylus* Zell., 9.vii.89; *Eurhodope suavella* Zinck., 9.vii.89; *Microthrix similella* Zinck., 16.vi.89 (c) Species from Buckinghamshire: Bradenham, *Dichrorampha consortana* Steph., reared 1.vii.89. (d) Species from Perthshire: Loch Tay, *Scrobipalpa acuminatella* Sirc., reared 10.v.89 ex *Cirsium arvense* L.

EMMETT, LT. COL. A.M. — (a) Distribution maps of the Coleophoridae with statistics. (b) Distribution maps of the Elachistidae with statistics. (c) Specimens: *Phyllonorycter leucographella* Zell., Wickford, Essex, first generation iv.89, second generation vii.89; a species new to Britain. *Yponomeuta rorrella* Hübn., Saffron Walden, Essex, 25–27.vii.89, a species enjoying a periodic spell of abundance. *Y. evonymella* Hübn., to draw attention to a massive immigration in Essex. *Agonopterix ciliella* Staint., Saffron Walden, 6.viii.89, the first record for Essex. *Pandemis cinnamomeana* Tr., Saffron Walden, 11.vii.89, second record for VC19. *Argyrotaenia ljungiana* Thunb., Saffron Walden, 25.vii.89; first record for VC19 for 40 years. *Anerastia lotella* Hübn., Saffron Walden, 14.vi.89, taken far from the coastal sandhills or Breck sands where it is resident.

FOSTER, A.P. — *Ethmia dodecea* Haw., Foulden Common, Norfolk, larva 23.viii.89. *Prochoreutis myllerana* F., Woodbastwick, Norfolk, larvae, moths bred 2.vii.89. *Acleris shepherdana* Steph. Stringshaw RSPB Reserve, Norfolk, larvae 13.vi.89, moths bred. *Calamotropha paludella* Hübn., Weeting Heath NNR, Norfolk, one at m.v.l. *Agriphila latistria* Haw., Winterton, Dunes, Norfolk, two 7.ix.89. *Phlyctaenia perlucidalis* Hübn., Brundall, East Norfolk, two 6.vii.89; Foulden Common, West Norfolk, 12.vii.89. *Anania verbascalis* D. & S., Hickling Broad, Norfolk, 29.vii.89.

HALL, N.M. — Longmoor Bottom, Berkshire, from the site here where the exhibitor found the uncommon *Phyllonorycter anderidae* Fletch. in autumn 1987, this continued to produce 100% *P. anderidae* in 1988.

HARPER, DR M. — *Pleurota aristella* L., two specimens were recorded in 1965 and 1971 from Jersey by R. Long and are in the National Jersey Collection. In vi.89, the specimens exhibited were found on dry grassland in Jersey, close to the site of the 1965 and 1971 examples; one came to light, while many others were seen flying short distances close to the ground between dawn and sunrise.

HECKFORD, R.J. — *Yponomeuta rorrella* Hübn., Plympton, Devon, 21.&22.vii.89; *Parocystola acroxantha* Meyr., Plympton, 15.&16.v.89, at light; *Eudonia mercurella* L., dark banded form, Stover Park, Devon, 4.viii.89. The following all from Ireland in 1989 while collecting with Dr J.R. Langmaid: *Coleophora pappiferella* Hofm., Leagh South, Co. Galway, 20-28.v; *Hypercallia citrinalis* Scop., Cahergrillaun, Co. Clare, ex 1. 12–14.vi., *Polygala vulgaris* L., Clooncoose, Co. Clare, ex 1. 16.vi., *P. vulgaris* L.; *Eulamprotes phaeella* Heckford & Langmaid, Leigh South, Co. Galway, 20–28.v.; new to VCH15; *Scrobipalpa murinella* H.-S., Leigh South, Co. Galway, 22.v., new to VCH15; Knockaunroe,

Co. Clare, 23.v.; *Aethes piercei* Obraztsov, Leagh South, Co. Galway, series showing intensity of markings, 20–28.v.; *Philedone gerningana* D. & S., Poulsallagh, Co. Clare, ex 1. 29.vi.–7.vii., *Helianthemum canum* L.; *Eana penziana colquhounana* Barr., ex 1. 18–24.vi. *Helianthemum canum* L., Poulsallagh, Co. Clare; *Collicularia microgrammana* Guen., Rosslare, Co. Wexford, 2.vi., first confirmed Irish record; *Cydia lunulana* D. & S., Killinny, Co. Galway, 27.v.; *Platyptilia tesseradactyla* L., Killinny, Co. Galway, 27.v.; *Stenoptilia saxifragae* Fletch., ex 1. 17.vi., *Saxifraga hypnodes* L., Clooncoose, Co. Clare; ex 1. 18.vi. *S. hypnodes* L., Cahergrillaun, Co. Clare.

JEWESS, P.J. — *Sciota adelphella* F.v.R., recently recognized as an overlooked British species; it has previously been confused with *S. hostilis* Steph. These specimens are from N. Kent (See *Entomologist's Gaz.* **39**: 271–274; *Entomologist's Rec. J. Var.* **101**: 173–174).

KNILL-JONES, S.A. — The following from Freshwater, Isle of Wight, 1989. *Pyrausta cingulata* L. 23.vii.; *Ostrinia nubilalis* Hübn. 14.vi.; *Palpita unionalis* Hübn., 19.x.; *Epiblema foenella* L., 22.vii.

LANGMAID DR J.R. — All taken or bred in 1989. *Lampronia publicornis* Haw., Leagh South, S. Galway, 26.v.89; Clooncoose, Co. Clare, pupa on *Rosa pimpinellifolia* L., 25.v.89, bred; *Agonopterix capreolella* Zell., Leagh South, Co. Galway, 26.v.89; *Bryotropha umbrosella* Zell., Fanore, Co. Clare, 31.v.89; *B. mundella* Dougl., Fanore, Co. Clare, 31.v.89; *Syncopacma sangiella* Stt., Caher River, Co. Clare, 1. on *Lotus uliginosus* Schkuhr, 22.v.89, bred; Cahergrillaun, Co. Clare, 1. on *L. uliginosus* Schkuhr, 22.v.89, bred; *Anacampsis temerella* L. & Z., Rosslare, Co. Wexford, 1. on *Salix repens* L., 2.vi.89, bred; *Pancalia latreillella* Curt., Leigh South, Co. Galway, 21.v.89; *Clepsis rurinana* L., Doughbranneen, Co. Clare, 1. on *Arctostaphyllos* 22.v.89, bred; Mullach Mor, Co. Clare, 1. on *Teucrium scorodonia* L. 26.v.89, bred; *Epiblema incarnatana* Hübn., Clooncoose, Co. Clare, 1. on *Rosa pimpinellifolia* L, 25.v.89, bred; *E. quadrana* Hübn., Leagh South, Co. Galway, 20.&24.v.89. *Stigmella aceris* Frey, Ledbury, Hereford; *Phyllonorycter mespilella* Hübn., Swanmore, Hants, bred *Cotoneaster*; *Yponomeuta rorrella* Hübn., Southsea, Hants; *Coleophora niveicostella* Zell., Shrewton, Wilts, *C. therinella* Tengst., Southsea, Hants., *Denisia albimaculea* Haw., Southsea, Hants.; *Agonopterix scopariella* Hein., Hayling Is., Hants., bred from *Lupinus arboreus* Sims; *Psamathocrita argentella* P. & M., Southsea, Hants; *Mompha subdivisella* Bradl., Cock Clarks, Essex; *Cosmopterix lienigiella* L. & Z., Leckford, Hants, new to VC12; *Piercia gilvicomana* Zell., Swyncombe Downs, Oxon; *Cydia illutana* H.-S., Tubney Wood, Oxon, larch cones, bred; *Phlyctaenia perlucidalis* Hübn. Stalham, Norfolk, *Cirsium arvense* L., bred*; *Dioryctria abietella* D. & S., Tubney Wood, Oxon, larch cones, bred.

MACNULTY, DR B.J. — Species from the Gower Peninsula. *Lampronia oehlmanniella* Tr., *Yponomeuta cognatella* Hübn., *Carcina quercana* F., *Agonopterix assimilella* Tr., *Agapeta zoegana* L. *Aethes cnicana* Westwood, *Eupoecilia angustana* Hübn., *Pandemis corylana* F., *P. heparana* D. & S., *Archips podana* D. & S., *Cacoechimorpha pronubana* Hübn., *Celypha striana* D. & S., *Lozotaeniodes forsterana* F., *Epagoge grotiana* F., *Sparganothis pilleriana* D. & S., *Tortrix viridana* L., *Croesia forsskaleana* L., *Acleris variegana* L., *A. emargana* F.,

* This appears to be the first time this species has been bred, at least in Britain. These bred moths are lovely, and so different from the numerous caught specimens I have seen, all of which have been more or less worn. — J.M.C.-H.

Olethreutes lacunana D. & S., *Apotomis lineana* D. & S., *Epinotia solandriana* L., *Epiblema cynosbatella* L., *E. scutulana* D. & S., *Anana funebris* Ström, *Nomophila noctuella* D. & S.

NASH, S. — *Yponomeuta rorrella* Hübn., Fernham, Oxon, large numbers in 1989; *Chilo phragmitella* Hübn., Fernham, Oxon, 14.vii.89; *Galleria melonella* L., Fernham, 22.vii.89, 10.ix.89; *Microstega hyalinalis* Hübn., Stroud, Glos., 24.vi.89; *Numonia marmorea* Haw., Braunton, N. Devon, 24.vii.89; *Anerastia lotella* Hübn., Braunton, 24.vii.89.

PARSONS, M. — *Eucosma metzneriana* Tr., Rye Harbour LNR, East Sussex, 14.vi.89; third British example. *Spatalistis bifasciana* Hübn., Rye Harbour LNR, E. Sussex, 14.vi.89. *Pediasia aridella* Thunb., Rye Harbour LNR, 14.vi.89. *Tinagma balteolella* F.v.R., Dungeness, Kent, two bred from dead stems of *Echium vulgare* L. collected 30.i.89. *Pempelia genistella* Dup., several from Dungeness, bred from larvae collected vi.89. *Ostrinia nubilalis* Hübn., Ninfield, E. Sussex, 12.xi.89, one of several seen in autumn 1989. *Oncocera semirubella* Scop., Church Ope Cove, Portland, Dorset, 16.iv.89.

SIMPSON, DR A.N.B. — *Gelechia turpella* D. & S., Bexley, Kent, 29.vi.89. pupae under bark of *Populus nigra* L. var. *italica* (Duroi), hatched 20.vi.–8.vii.89. *Infurcitinea argentimaculella* St., Worcs, VC37, ex larvae 2–4.89. *Pammene germmana* Hübn., Tiddesly Wood, Worcs, VC37, resting on underside of aspen leaf, 7 a.m., 29.v.89. *Trifurcula subnitidella* Dup., Painswick Beacon, Glos., VC33, tapped from limestone bank, 18.vi.89. *Mompha subdivisella* Bradley, Worcester City, VC37, in stems of *Epilobium hirsutum* L. on waste ground, x.89.

SKINNER, B. — *Hellula undalis* F., Eastbourne, Sussex, at m.v.l. 23.x.89; third British record.

STERLING, M.J., P.H. AND COL. D.H. — *Phyllonorycter leucographella* Zell., some specimens of the new-to-Britain *Phyllonorycter* introduced by A.M. Emmet in *Entomologist's Rec. J. Var.* **101**: 189–194, bred from mines in *Pyracantha* collected at East Ham, London on 27.iii.89. *Glyphipterix equitella* Scop. Binsley, Oxon VC23, bred from *Sedum acre* L. growing on a wall, collected 5.v.89 *Yponomeuta rorrella* Hübn., part of the 'population explosion' of this usually scarce species; specimens are from Oxfordshire VCs 22 & 23 and Hampshire VCs 11 & 12. *Cataplectica farreni* Wals., Swyncombe Downs, Oxfordshire VC22, bred from *Pastinaca* heads, collected 20.viii.88, from which place caught specimens were exhibited in 1988; there does not appear to be any previous record of this species having been bred in Britain. *Coleophora gardesanella* Toll, from a new Hampshire locality; for other purposes, some *Achillea millefolium* L. roots were dug from the lower part of a cliff at Milford-on-Sea VC11 on 1.i.89; in June, four *Coleophora* larvae were seen feeding and these fixed at the end of June; it was noted that two cases were smaller, much slimmer and fixed at a lower angle (approx. 40° compared with over 60°) — as suspected, these were *C. gardesanella*, whilst the other two were *C. trochilella* Dup. *Cosmopterix lienigiella* L. & Z., Leckford, Hampshire VC12, from mines collected from *Phragmites* on 30.x.88; a new VC record. *Phalonidia gilvicomana* Zell., Swyncombe Downs VC23, bred from seeds of *Mycelis* collected 29.viii.88. *Aethes margaritana* Haw., Sandwich, Kent, bred from heads of *Achillea millefolium* L. collected 19.i.89. *Cochylis flaviciliana* Westw., Fingest, Bucks., bred from *Knautia* heads collected 23.viii.88. *Lobesia botrana* D. & S., two new county records: one from Oxford VC23 on 24.v.89, and one from Winchester VC11 on 9.viii.89. *Cydia medicaginis* Kuznetsov, a specimen collected 2.vii.83 from Grays, Essex was dissected in 1983 and the genitalia seemed to resemble most closely that figured by Pierce & Metcalf for *Cydia succedana* D. & S. The specimen has until now been kept as an unusual

form of this species, but the genitalia diagrams shown in *Entomologist's Gaz.* **40**: 195 now reveal its true identity! *Cydia illutana* H.-S. First bred British specimens, from larch cones collected from trees in Tubney Wood, Oxford VC22 on 6.viii.88. A number of *Cydia* larvae left the cones and entered the rotting wood provided. Most were kept outdoors in a pot covered with netting, but a few were kept in a garage and sprayed weekly. Three moths emerged from those kept inside and none from the outside ones. Continental authors give green cones of *Picea abies* as the main food, but efforts to find larvae in spruce cones in Britain have failed.

WARREN, R.G. — *Monochroa lucidella* Steph., Crymlyn Bog, W. Glamorgan, 23.vi.89. *Anacampsis temerella* Zell., Crymlyn Bog, 23.vi.89. *Ypsolopha lucella* F., Swynnerton, Staffs., 24.viii.89; new to Staffordshire; beaten from an oak. *Ptycholomoides aeriferanus* H.-S., Ashley Heath, Staffs., 10.vii.89. *Lobesia littoralis* H. & W., Trentham, Staffs., 13.ix.89, in m.v. trap. *Bactra robustana* Christ., Pennard Pill, Gower, W. Glamorgan, 20.vi.89. *Epiblema turbidana* Tr., Manifold Valley, Staffs., 25.vi.84. *Pyrausta sanguinalis* L. Wallasey, 9.vii.*1935*. Probably the last *sanguinalis* to have been seen on the Wallasey sandhills. *Evergestis pallidata* Hufn., Chillington, Staffs, 16.vii.89; new to Staffs.

YOUNG, DR. M.R. — *Elachista albifrontella* Hübn., Isle of Barra, Outer Hebrides. By comparison with typical Scottish specimens the Barra examples have very obscure, 'smudgy' markings on a grey ground colour.

FOREIGN LIPIDOPTERA

CORLEY, M.F.V. — An exhibit of moths taken or bred from the Algarve, Portugal, as a result of a week's collecting from 16–23.iii.89, by day and at night with m.v.light. All species encountered were exhibited with the exception of *Macroglossum stellatarum* L., *Peridroma saucia* Hübn. and *Phlogophora meticulosa* L. The commonest species at the villa in Loulé which was the week's headquarters were *Agrotis puta* Hübn., *Mythimna scirpi* Dup., *Nebula ibericata* Stdgr, *Eupithecia dodoneata* Guen. and *E. cocciferata* Mill.

In many ways late March in the Algarve is comparable with late May in England, but the comparison does not hold very well, as the presence of such species as *Scopula imitaria* Hübn. and *Idaea contiguaria* Hübn. show. They may well be continuous brooded in Portugal.

The climate of the Algarve is much warmer and sunnier than that of England, but even more significant for insect life histories is the almost total absence of a true winter (frosts are almost unknown and mid-winter temperatures can exceed 80°F), and the summer drought (no rain falls in June, July and August).

About half the species seen are on the British list, although some of these are very local in Britain or are scarce immigrants. The Portuguese fauna is poorly known: six of the Macrolepidoptera exhibited are not listed for Portugal by Bustillo & Varela (1981, 1984). They are *Eupithecia dodoneata* Guen., *Epirrhoe sandosaria* H.-S., *Catarhoe cupreata* H.-S., *Horisme scorteata* Studgr, *Dyscia distinctaria* Bang-Haas and *Hadena sancta* Stdgr, though it is possible that the last two have been recorded under different names.

The Microlepidoptera present greater problems of identification, but over three-quarters of those taken are now named with reasonable certainty. There are probably over 20 species new to Portugal among those exhibited, but this is difficult to ascertain, as there is no recent list of Portuguese species.

Of the species reared, most emerged between April and early June, but *Mirificarma mulinella* Zell. and *Metzneria aestivella* Zell. emerged in August and

early September. Larvae of *Stigmelia cistivora* H. Peyer. hatched at the end of September. Larvae of *Coleophora thymi* Her. (not exhibited) were moving about at the time of the Exhibition, having ceased feeding in June. Females of *Heterogynis penella*. Hübn. emerged from cocoons collected on *Calycotome* plants. It was astonishing when larvae appeared without any moths having apparently hatched. On opening a cocoon, it was realized that the wingless females never emerge from their cocoons. No males were seen in the field, or bred, but evidently some of the cocoons collected contained mated females. The males are thinly scaled insects with long genitalia, which enable them to reach the female within.

The full list of species exhibited is as follows: *Micropterix ibericella* Caradja, *Stigmella subervivora* Stt., *S. cistivora* Peyer., *Heterogynis penella* Hübn., *Opostega chalcopepia* Wals., *Heliozela sericiella* Haw., *?Proterospastis quadruplella* Caradja, *Monopis crocicapitella* Clem., *M. imella Hübn., Trichophaga bipartitella* Rag., *Lyonetia daphneella* Stdgr, *Phyllonorycter endryella* Mann, *Ethmia bipunctella* F., *Chambersia ?augustella* Hübn., *Esperia sulphurella* F., *Depressaria* sp., *Agonopterix* sp., *A. rotundella* Dougl., *Elachista* sp., *E. gormella* Niels. & Tr.-Ulsen, *Polymetis piperatella Studgr, Coleophora* sp., *C. trifolii* Curt., *C. subcinerea* Stdgr, *Symmocoides oxybiellus* Mill., *Coccidiphila ledereriella* Zell., *Metzneria aestivella* Zell., *M. castiliella* Möschl., *Eulamprotes helotella* Stdgr, *Pseudotelphusa* sp., *Mirificarma mulinella* Zell., *Scrobipalpa ocellatella* Boyd, *S. phagnalela* Const., *Ephysteris promptella* Stdgr, *Aproaerema anthyllidella* Hübn., *Syncopacma larseniella* Gozm., *Dichomeris limbipunctella* Stdgr, *Zelleria oleastrella* Mill., *Plutella xylostella* L., *Clepsis unicolorana* Dup., *C. siciliana* Rag., *C. consimilana* Hübn., *Lozotaenia cupidinana* Stdgr, *Cnephasia incertana* Treits., *Lobesia botrana* D. & S., *Gypsonoma dealbana* Frröl., *Thiodiodes seeboldi* Rössl., *Cydia succedana* D. & S., *C. splendana* Hübn., *Stenodes straminea* Haw., *S. chamomillana* H.-S., *S. discopunctana* Evers., *S. sparsana* Stdgr, *Eudonia lineola* Curt., *E. angustea* Curt., *Aporodes floralis* Hübn., *Pyrausta sanguinalis* L., *Udea ferrugalis* Hübn., *Nomophila noctuella* D. & S., *Diasemiopsis ramburialis* Dup., *Arnia nervosalis* Guen., *Epischnia illotella* Zell., *Oxybia transversella* Dup., *Acrobasis obliqua* Zell., *Crombrugghia distans* Zell., *Marasmarcha lunaedactyla* Haw., *Pterophorus chorodactyla* Stdgr, *Drepana uncinula* Borkh., *Nebula ibericata* Stdgr, *Horisme scorteata* Stdgr, *Eupithecia venosata* F., *E. dodoneata* Guen., *E. cocciferata* Mill., *Gymnoscelis rufifasciata* Haw., *Epirrhoe sandosaria* H.-S., *Rhodometra sacraria* L., *Idaea elongaria* Ramb., *I. obsoletaria* Ramb., *I. contiguaria* Hübn., *I. degeneraria* Hübn., *Scopula imitaria* Hübn., *Catarhoe cupreata* H.-S., *Gnopharmia stevenaria* Boisd., *Rhoptria asperaria* Hübn., *Petrophora narbonea* L., *Pachynemia hippocastanaria Hübn., Toulgoetia cauteriata* Stdgr, *Menophra abruptaria* Thunb., *M. japygiaria* Costa, *Peribatodes manuelaria* H.-S., *Adactylotis gesticularia* Hübn., *Aleucis distinctata* H.-S.. *Gnophos mucidarius* Hübn., *Aspilates ochrearia* Rossi, *Dyscia distinctaria* Bang-Haas, *Euproctis chrysorrhoea* Linn., *Nola chlamytulalis* Hübn., *Agrotis segetum* D. & S., *A. puta* Hübn., *Hadena sancta* Stdgr, *Mythimna albipuncta* D. & S., *M. unipuncta* Haw., *M. l-album* Linn., *M. scirpi* Dup., *Calophasia almoravida* Graslin, *Recoropha canteneri* Dup., *Spudaea ruticilla* Esp., *Acronicta psi* L., *Caradrina clavipalpis* Scop., *C. noctivaga* Bell., *Porphyrinia ostrina* Hübn., *Eutelia adulatrix* Hübn., *Zebeeba falsalis* H.-S., *Nycteola columbana* Turn., *Trichoplusia orichalcea* F., *Nodaria nodosalis* H.-S.

Cronin, Mrs N. — A case of butterflies (Rhopalocera) taken at San Pablo, Lugon, Philippines, during June, 1989.

Edwards, Dr and Mrs P.J. — A collection of moths from in or around L'Escala, Costa Brava, Prov. Gerona, Spain, made mostly during the autumn of 1988 and

spring 1989, of which the most interesting were two *Cucullia argentea* Hufn. This species has been rumoured to be in the Province of Gerona in recent years, but these two confirm its presence in Spain. Although there are a few scattered records from France, this species is better known from central and eastern Europe; *Calophasia hamifera* Stdgr, a new record for Gerona; *Catephia alchymista* D.& S. compared with the smaller but similar *Aedes leucomelas* L.; and a selection of Noctuidae that are uncommon migrants to the British Isles.

GOATER, B. — (a) Geometridae and Noctuidae from the Sierra de Gredos, Avila, 1720 m. and Sierra de Guadarrama, Madrid, 2200 m. taken in July 1989. These two high sierras in west-central Spain have similar, but not identical faunas including a number of endemic species and subspecies. The exhibit included *Kemtrognophos predotae* Schaw. and *Costignophos avilarius* Reiss., both endemic; *Euxoa haverkampfi continentalis* Reiss., endemic and probably specifically distinct from *E. haverkampfi* Stndfs from Corsica; *Standfussiana dalmata occidentalis* Brsn and a dark form of *S. lucernea* L.; *Rhyacia cervantes* Reiss. with *R. grisescens* F. from the Alps and Spanish Pyrenees for comparison; *Diarsia guadarramensis* Boursin with *D. mendica* F. from France and England for comparison; *Hada nana gredensis* Schaw. and *H. proxima nevadensis* Reiss. with specimens of the nominotypical races from France for comparison; *Cryphia ravula ereptriculoides*, the form from Gredos being particularly large and richly marked, with typical *C. ravula* from S. France for comparison; *Apamea platinea splendida* Reiss., with *A. platinea* from the Alps and Spanish Pyrenees for comparison; and *Oligia fasciuncula hispanica* Lempke, very robust and well-marked compared to specimens from France and England.

(b) Noctuidae from Spain and Portugal taken during 1989, including *Ogygia forcipula guedellanea* Oberth. compared with *O forcipula forcipula* D. & S. from S. France; *Ochropleura candelisequa zapateri* Schwing. compared with nominotypical *O. candelisequa* D. & S. from S.E. France, *Ochropleura leucogaster* Freyer from Spain and Portugal, compared with *O. plecta unimacula* Stdgr from N. Spain and *O. plecta plecta* L. from France and England; a variable series of *Eugnorisma arenoflavida* Schaw. from Albarracin, Teruel, compared to the more robust and comparatively invariable *E. depuncta* L. from Scotland and S. France; *Chersotis andreae* Dufay, *C. fimbiola iberica* Zerny from central Spain compared with a larger and much more heavily marked form from the Sierra de Gredos; *Noctua interposita* Hübn. and *N. orbona* Hufn., both from N. Spain; a short series of *Mythimna joannisi arbia* Brsn & Rungs taken on the coast Valencia in early April; *M. punctosa* Treits. from los Monegros, Huesca and the French coast near Perpignan, compared to the very dark form of *M. putrescens* Hübn, that occurs on los Monegros; *Omphalophana serrata* Treits., found commonly on some sandhills near Lagos, Portugal, in late March, and *Cleonymia baetica* Ramb. and *Amephana aurita* F. from los Monegros in May; *Dicycla oo* L. *f. sulphurea* Stdgr, a form apparently not uncommon in Spain, compared with some very dark ab. *renago* Haw. from S. France taken at the end of May, and a selection of English specimens.

(c) A drawer of Crambinae from Britain, France and the Iberian Peninsula; 55 species were shown, out of a total of about one hundred reported for the area, including several *Euchromius gozmanyi* Bles. from the French coast near Perpignan (genitalia det.). This species does not figure in Leraut's checklist of Lepidoptera, but there is a specimen in Brit. Mus. (Nat. Hist.) taken at Cavalaire, Var, in 1964 by S.N.A. Jacobs.

HALL, N. — (a) Some interesting species recently bred from France and Spain: *Campaea honoraria* D. & S. Like its British congener, the larva has a third pair of abdominal claspers. It feeds on oak (*Quercus* spp.); *Graellsia isabellae* Graells. two

females bred from small larvae from Spain given the exhibitor by Snr Josep Ylla i Ullastre, shown with a wild-caught male for comparison; *Arctornis l-nigrum* O.F. Müll. Having read that it was difficult to get hibernated larvae of this species to resume feeding, it was decided to bring four of them into the warm as soon as their foodplant (lime) had begun sprouting: they wandered about but ate nothing. They were sprayed with water in the belief that they were at risk through dehydration, but all died. After a further month, the remaining larvae were brought in from the plastic boxes in the garden shed where they had spent the winter, disturbed, and placed on the foodplant. They either began feeding spontaneously or reattached themselves to the sides of the container and became motionless. The reluctant larvae were refrigerated for two days, removed and disturbed again. After one or more of these treatments all larvae commenced feeding and were reared without trouble. They were not sprayed. It had been feared the larvae would not survive hibernation because of the exceptional mildness of the winter; however, the captive larvae completed more instars in the autumn than they do in the wild, and this probably increased their chance of survival; *Archanara geminipuncta* Haw. Large specimens bred from a coastal reedbed in the Pyrenees Orientales, from stems showing the classic signs of the presence of this species; *Brithys crini pancratii* Cyrillo. Bred from larvae found in great abundance on *Pancratium maritimum* on the Mediterranean coast of France; *Tephronia sepiaria* Hufn. A female caught in Spain in June 1988 laid eggs which hatched at the end of the month. The larvae were fed on lichens scraped from a wall; they aestivated, eating practically nothing, and then fed up slowly from late autumn. By the end of July 1989, 13 months later, only two remained alive. Although fully grown, they were only 11 mm long and still difficult to find because of their excellent camouflage. Both eventually pupated among the lichen, and produced a male and a female moth; *Pechipogo plumigeralis* Hübn. A hypenid with spectacular fanned feet; bred from a gravid female taken in the Gard, France. The larvae fed on bramble, oak and dock, preferring withered leaves; *Gortyna xanthenes* Germ. This is a pest species in southern Europe, feeding on globe artichokes. Larvae were extracted from the bases of artichoke stems in early June 1989, and reared successfully in carrots. Pyrenees Orientales.

(b) A selection of other interesting species taken in France during 1989 including *Phragmataecia castanaeae* Hübn., Pyr. Orient.; *Heterogenea asella* D. & S., Loir-et-Cher; *Adscita globulariae* Hübn., Aude, taken at light; *Sclerocona acutellus* Eversm., Hérault & Pyr. Orient.; *Costaconvexa polygrammata* Borkh., Hérault; *Siona lineata* Scop., Ardèche; *Laelia coenosa* Hübn., male, Hérault; *Pelosia obtusa* H.-S., including females, Loir-et-Cher; *Spiris striata* L., a large form, Hérault; *Coscinia cribraria* Linn., Lot; *Spilosoma urticae* Esp., Hérault; *Simyra albovenosa* Goeze, Pyr. Orient; *Acronicta leporina* L., the pure white Continental form, Loir-et-Cher; *A. euphorbiae* D. & S., Lot; *Actinotia polyodon* Clerck, Lot; *Dicyla oo* L., Hérault & Ardèche, flying at the end of May; *Eublemma ostrina* Hübn., Gard; *Eustrotia uncula* Clerck, Loire Atl.; *Deltote bankiana* F., Loir-et-Cher; *Colobochyla salicalis* D. & S., Loir-et-Cher; *Trisateles emortualis* D. & S., Loir-et-Cher.

HARMAN, T.W. — (a) A new species of the Genus *Eurypteryx* (Sphingidae) taken in Khoa Yai National Park, Thailand, 9.iv.88. This unique male is being described and will be called *Eurypteryx geoffreyi* Cad. & Harman in memory of Geoffrey Allen. Geoffrey, who died on the same day as this moth was captured, was the father of Col. M.G. Allen, organizer of the expedition.

(b) A selection of Lepidoptera taken during a faunal survey near Les Eyzies, Dordogne, France, 22–31.viii.89, including a series of *Arethusana arethusa* D. & S., showing range of colour and markings.

HOLLINGWORTH, DR T.S. — A general exhibit of Lepidoptera collected from parts of southern France, mainly on the Atlantic coast and in the foothills of the Pyrenees. Particular emphasis was given to the Pyralidae, but many other families were represented; about one-third of the species shown are not recorded from the British Isles, and a further third are relatively uncommon in Britain. Among the Macrolepidoptera, the most interesting species was *Adalbertia castiliaria* Stdgr, two males and a female, of which there seems to be only one previous record for France, though it is common in pinewoods in northern Spain. The list of Microlepidoptera is given in full: *Ochsenheimeria hederarum* Mill., *Ethmia pusiella* L., *Dafa formosella* D. & S., *Harpia forficella* Scop., *Coleophora leucapennella* Hübn., *Oegoconia caradjai* Popescue-Gorj & Capus, *Cosmopterix orichalcea* Stt., *Eulamprotes wilkella* L., *Syncopacma taeniolella* Zell., *Brachmia triannulella* H.-S., *Yponomeuta rorrella* Hübn., *Kessleria egregiella* Dup., *Argyrotaenia pulchellana* Haw., *Choristoneura hebenstreitella* Müll., *Eana penziana* Clerck, *Lobesia botrana* D. & S., *Rhyacionia buoliana* D. & S., *R. pinicolana* Doubl., *Echromius bella* Hübn., *Chrysocrambus craterella* Scop., *Pediasia fascelinella* Hübn., *Platytes alpinella* Hübn., *Ancylolomia tentaculella* Hübn., *Eudonia pallida* Curt., *Evergestis limbata* L., *Pyrausta castalis* Triets., *P. cespitalis* D. & S., *Margarita sticticalis* L., *Uresiphita limbalis* D. & S., *Sitochroa palealis* D. & S., *Ostrinia nubilalis* Hübn., *Anania verbascalis* D. & S., *Mutuuraia terrealis* Treits., *Opsibotys fuscalis* D. & S., *Diasemia reticularis* L., *Diasemiopsis ramburialis* Dup., *Synaphe punctalis* F., *Actenia brunnealis* Treits., *Pyralis farinalis* L. *Aglossa caprealis* Hübn., *Pyla fusca* Haw., *Phycita roborella* D. & S., *Oncocera semirubella* Scop., *Pempelia palumbella* D. & S., *P. genistella* Dup., *Dioryctria* spp., *Microthrix fallax* Stdgr, *Nephopterix angustella* Hübn., *Acrobasis tumidana* D. & S., *A. repandana* F., *A. consociella* Hübn., *A. porphyrella* Dup., *Numonia marmorea* Haw., *N. advenella* Zinck., *Apomyelois bistriatella* Hulst, *Euzophera fuliginosella* Hübn., *Nyctegretis lineana* Scop., *Plodia interpunctella* Hübn., *Phycitoides sacicola* Vaugh.

MACNAMARA, D.S.K. — (a) Two typical examples of *Brahmaea wallichii insulata* Inoue (the Taiwanese owl moth), and the following aberrant forms: three ginger-coloured, one charcoal-coloured. These forms are possibly new, and have not been named.

(b) Three typical examples of *Brahmaea wallichii japonica* Butl. (the Japanese owl moth), one typical *B. wallichii insulata* and one hybrid *japonica* male x *insulata* female, possibly the first time that this hybridization has been achieved.

ORAM, D.A. — Some moths taken in the Falkland Islands during March–April 1989; collecting was concentrated in two main regions, Carcass Is. in the northern part of the archipelego, and around Stanley in the south-east part of East Falkland. Two species of Lepidoptera new to the Falklands are believed to have been discovered.

From Stanley: *Tinea pallescentella* Stt. (Tineidae) and *Agrotis hispidula* (Guen., *Caphornia xanthostola* Mab. and *C. ochricraspia* Hamps. (Noctuidae).

From Carcass Island: six specimens of an as yet unidentified species of Geometridae, probably Larentiinae, and *Agrotis hispidula* and *Pseudo-leucania tephra* Köhler (Noctuidae), the latter also new to the archipelego.

PITTIS, REV. S.C. — A striking striated underside female of *Palaeochrysophanus hippothoe eurydame* Hoffmannsegg captured on a school trip to Austria in 1969. It had been placed meanwhile in a store box and forgotten about!

SIMMONS, M.J. — Some moths taken during a two-week stay in Poland, between 25.vi and 8.vii.89. (a) Czerlonka, Puszcza Bialowieza: with the exception of the *Zygaena* and *Synanthedon*, these moths were taken at lights outside the railway

station in Czerlonka or at a 100W bulb outside one of the village houses. The days were hot, but at night the temperature dropped under a clear sky, and conditions were more like an English October or November; even so, an interesting variety of species was seen: *Zygaena osterodensis* Reiss. (= *scabiosae* auctt.), *Synanthedon spheciformis* D. & S., *S. flaviventris* Stdgr, *Geometra papilionaria* Linn., *Comibaena bajularia* D. & S., *Scopula immorata* L., *Pelurga comitata* L., *Thyatira batis* L., *Philudoria potatoria* L., *Euproctis similis* Fuessl., *Leucoma salicis* L., *Spilosoma urticae* Esp., *Mythimna conigera* D. & S., *Cerapteryx graminis* L., *Hada nana* Hufn., *Lygephila viciae Hübn., Parascotia fuliginaria* L.

(b) Janow Lubelski, Puszcza Solska. All moths taken at m.v. light at a farmhouse on the edge of the forest, about 3 km from Janow Lubelski. Here, the nights were overcast and much warmer. Species taken were *Plemyria rubiginata* D. & S., *Semiothisa notata* L., *Abraxas sylvata* Scop., *Angerona prunaria* L., *Biston betularia* L., *Arichanna melanaria* L., *Philudoria potatoria* L., *Dendrolimus pini* L., *Habrosyne pyritoides* Hufn., *Thyatira batis* L., *Hyloicus pinastri* L., *Deilephila elpenor* L., *Pheosia tremula* Clerck, *Euproctis similis* Fuessl., *Eilema lurideola* Zinck., *Lithosia quadra* L., *Diacrisia sannio* L., *Ceramica pisi* L., *Mythimna turca* L., *M. conigera* D. & S., *Apamea monoglypha Hufn., Panthea coenobita* Esp., *Trachea atriplicis* L., *Callopistria juventina* Stoll., *Plusia putnami gracilis* Lempke, *Cosmia pyralina* D. & S.

(c) Susiec, Puszcza Solska, taken by day in a rough, uncultivated meadow: *Zygaena diaphana* Guhn., *Soiris striata* L., *Emmelia trabealis* Scop. and two unidentified *Adscita* spp.

(d) Hutki, near Puszcza Solska: *Callimorpha dominula* L.

TREMBATH, D.A. — A selection of Rhopalocera collected in Kenya between December 1987 and January 1989, including the following species of particular interest: *Papilio lormieri* Dist., subsp. *crocea* Storace from W. Kenya with narrow median band; *P. interjecta* van Som., now separated from *P. bromius* Doubl.; *Colias phisadia* Godart, two subspecies, one from N. Kenya, one from the Coast; *Belenois thysa* Hopff., a lovely female form; *Pseudacraea eurytus* L., various male forms showing ability for mimicry; *Acraea cinereria* Neave, found in swarms numbering millions in Dec. 88: few were seen in Dec. '87, and none before in several December visits; *A. penelope* Stdgr, a yellow female form *exalbescens* Etringham; *A peneleos* Ward, similar to the above but much rarer in Kenya; *A. rogersi* Hew., a rare species in which very few females are known; and *A. chilo* Godm. subsp. *magnifica* Carpenter & Jackson, only known from Mt. Kulal area in northern Kenya: these specimens were taken on the adjacent Mt. Nyiro; a selection of *Neptis* spp., with a brief description of differentiating features of part of the group; the very rare *N, nicobule* Holland was included in the exhibit; *Epamera trajorca* Walker, north Kenya; *Tarucus rosaceus* Austaut and *T. kulala* Evans, found flying together in the Mt. Kulal area.

The only known specimen of *Chloroselas trembathi* sp. nov., holotype female, about to be described by Collins & Larsen.

WAITE, P. — (a) *Pseudochazara geyeri occidentalis* Rebel & Zerny: four specimens, showing males, female and underside. This species is thought to occur in Europe only in parts of Albania and Yugoslavian Macedonia, on Mt. Galicica, above Lake Ochrid; these specimens were taken on 3.viii.89, at 1400 m.

(b) *Spiris striata* L.: one typical specimen and two with black hindwings, f. *melanoptera* Brahm. This form was not uncommon among a large colony of the species flying by day on the southern slopes of Mt. Galicica, at 1850 m, in late July 1989.

WARING, P. — A collection of moths recorded in northern Spain between 25.viii. & 5.ix.89. Of particular interest were *Mythimna unipuncta* Haw., which was common on the Spanish coast, *Alcis jubata* Thunb., found in lichen-covered beechwoods where no oak was present, and *Orgyia aurolimbata* Guen., males of which were flying by day on open mountain slopes at over 1600 m. Other species, sometimes recorded as migrants in Britain, included *Rhodometra sacraria* L., *Agrotis crassa* Hübn., *Mythimna vitellina* Hübn., *M. albipuncta* D. & S., *Trachea atriplicis* L., and *Dysgonia algira* L.

DIPTERA

Eleven exhibitors contributed to the display of Diptera this year, a reduced number from 1988 but a wide range of interesting specimens were included. Eight species new to the British List were the highlight of the day including two Syrphidae and two Stratiomyidae, both species of *Oxycera* of which single examples were discovered by Alan Stubbs at previously unworked spring sites, one of which also produced a distinctive crane fly previously known only from Spain. Pipunculidae and Sciomyzidae featured in several exhibits, and a new find of *Antichaeta obliviosa* (End.), only recently added to the British list by Jonathan Cole, was exhibited by Steven Falk. As usual Syrphidae predominated but Conopidae and Tephritidae also added to the diversity of the exhibits.

ALEXANDER, K.N.A. AND GROVE, S.J. — Selected flies found during National Trust biological survey fieldwork in Cornwall (both exhibitors) and West Sussex (S.J.G. only) in 1989. Seven species from Cornwall and three from Sussex were new county records. Notable species exhibited were — Cornwall: *Ctenophora pectinicornis* (L.) (Tipulidae) reared from a pupa found in a rot hole of an old holly in Pengweden Wood, Helford, 29.vi.; *Dolichopus signifer* Hal. (Dolichopodidae), both sexes from a cliff seepage, Cudden Point, 18.v.; *Brachyopa insensilis* Collin, hovering round beech buttress in Higher Hill Wood, Trencrom, 20.v.; *Eumerus sabulonum* (Fall.) from mown path through bracken on Gribbin Head, 29.vi. (only record from south coast in Cornwall); *Cryptaciura rotundiventris* (Fall.) and *Urophora spoliata* (Hal.) (Tephritidae), swept from grass heath on Pentargon Cliff, Boscastle, 12.vii. Sussex: *Acanthiophilus helianthi* (Rossi), Beeding Hill, 1.viii.; *Gymnosoma rotundatum* (L.) on umbel, Steer's Common, 24.vii.

CHANDLER, P.J. — Some fungus gnats with spore-feeding larvae which spin webs on bracket and encrusting fungi and produce cocoons, in which adult development takes place, on or near the substrate. Reared examples of three species of *Keroplatus* (Keroplatidae) and two species of *Sciophila* (Mycetophilidae) were exhibited. *Keroplatus testaceus* Dalman is the only British species of its genus but three other species occur in northern France (two of these, *K. tipuloides* Bosc and *K. reaumurii* Duf., reared in 1989 from larvae collected in France were exhibited). *K. tipuloides* and *Sciophila rufa* Meig. are both specific to *Fomes fomentarius*; they occur together in France where the fungus grows on beech (as it does locally in southern England); *S. rufa* is found here only in Scotland, where the fungus grows on birch. The closely related *S. ochracea* Walk. is little known but seems specific to *Phellinus pomaceus* so occurs in orchards and gardens where the fungus grows on plum and other rosaceous trees; specimens reared by E.P. Wiltshire from larvae found in his garden at Cookham, Berks in v.1988 were exhibited.

FALK, S.J. — In addition to interesting exhibits of various Diptera collected on visits to Nepal and Cyprus, 42 species collected in recent years in Britain were also exhibited. Notable finds among these were: *Odontomyia angulata* (Panz.)

(Stratiomyidae), East Walton Common, Norfolk, 6.vii.89; *Xanthandrus comtus* (Harr.) (Syrphidae), Brownsham, N. Devon, 17.vi.89; *Platycheirus sticticus* (Meig.) (Syrphidae), Ballater, South Aberdeen, 1.vi.86; *Cheilosia chrysocoma* (Meig.) (Syrphidae), Castor Hanglands N.N.R., Northants, 30.iv.89; *Eumerus sabulonum* (Fall.) (Syrphidae), Welcombe Mouth, N. Devon, 16.vi.89 and Morwenstow, E. Cornwall, 16.vi.89; *Brachypalpus laphriformis* (Fall.) (Syrphidae), Pillaton, E. Cornwall, 3.vi.89; *Myopa fasciata* Meig. (Conopidae), Pirbright Common, Surrey, 13.viii.89 with *Andrena fuscipes* (Kirby); *Antichaeta analis* (Meig.) (Sciomyzidae), Laugharne Burrows, Carms., 18.vii.88; *A. obliviosa* (End.) (Sciomyzidae), Woodwalton Fen, Cambs., 28.v.85; *Nanna brevifrons* (Zett.) (Scathophagidae), Fearchar Burn, S. Aberdeen, 1.vi.86 and Ballater, S. Aberdeen, 31.v.86.

HALSTEAD, A.J. — Eight species of Diptera collected in 1989, including *Stratiomys singularior* (Harr.) (Stratiomyidae), at *Heracleum* flowers, Braunton Burrows, N. Devon, 13.vi.; *Nephrocerus flavicornis* Zett. (Pipunculidae), swept from oak, R.H.S. Garden, Wisley, Surrey, 1.vi.; *Myopa fasciata* Meig. (Conopidae), on *Cirsium arvense* L. flowers, 29.vii., Horsell Common, Woking, Surrey.

HOLLIER, J.A. AND BELSHAW, R.D. — A selection of Syrphidae, Pipunculidae and Conopidae collected using malaise traps during 1989, in four plots of different successional age at Silwood Park, Berks, set up for the collection of Tachinidae. These included *Caliprobola speciosa* (Rossi) (Syrphidae), 20–22.v.; *Mallota cimbiciformis* (Fall.) (Syrphidae), 17–20.vi.; *Volucella inflata* (F.) (Syrphidae), 26–30.v.; *Nephrocerus flavicornis* Zett. (Pipunculidae), 17–20.vi.; *N. scutellatus* (Macq.) (Pipunculidae), 20–22.v.89, the third British record of the latter; *Myopa testacea* (L.), 5–12.v.

MCLEAN, I.F.G. — Five species of Sciomyzidae from Thompson Common, Norfolk, 8.vii.89: *Pherbellia nana* (Fall.), *P. argyra* Verbeke, *Tetanocera freyi* Stackelberg, *Psacadina zernyi* Mayer and *Dichetophora obliterata* (F.)

MORRIS, R. — Maps showing some of the trends emerging from the Surrey Hoverfly Scheme were displayed. Forty-four species of the more notable Diptera found by the exhibitor in Surrey were also exhibited, all Syrphidae except *Chetostoma curvinerve* Rond. (Tephritidae), White Beech, 3.iv.88 and *Oxycera rara* (Scop.) (Stratiomyidae), Tuesley, 15.vii.89. Other species shown included the following: *Epistrophe melanostoma*, new to Britain from Banstead Downs, 15.v.88; *E. diaphana* (Zett.), Bay Pond, Godstone, 6.vii.88 and Upper Gatton, 18.vi.88; *Epistrophella euchroma* (Kow.), Ashtead Common, 21.iv.87; *Melangyna quadrimaculata* (Verr.), Wotton Woods, 3.iv.88; *M. guttata* (Fall.), Coxes Lock, 5.vii.87 and Gomshall, 13.vii.86; *M. triangulifera* (Zett.), Ashtead Common, 26.iv.87 and Cooper's Hill, 14.v.88; *Brachyopa insensilis* Collin, Morden Park, 21.v.89; *B. pilosa* Collin, Limpsfield Chart, 1.vi.88; *Pelecocera tricincta* Meig., Chobham Common, 27.vi.87; *Myolepta luteola* (Gmel.), Upper Gatton, 2.viii.87 and Merrow Common, 5.vii.87; *Volucella inflata* (F.), White Beech, 19.vi.88 and Hackhurst Down, 21.vi.86; *Brachypalpus laphriformis* (Fall.), Box Hill, 27.v. and 13.vi.86 and Bealeswood Common, 9.v.87; *Microdon devius* (L.), White Down, 15.vi.87; *M. eggeri* Mik, Spur Hill, 9.vii.86; *M. mutabilis* (L.), Wisley Common, 15.vi.86.

PERRY, I. — Twelve species of uncommon Diptera found during 1989: *Pamponerus germanicus* (L.) (Asilidae), from fixed dunes and pine woodland at Morfa Harlech, Gwynedd, 19–21.v.; *Eriozona syrphoides* (Fall.) (Syrphidae), two females on flowers of *Hypochoeris radicata* L., Coed y Brenin Forest, Gwynedd, 23.viii.; *Meligramma guttata* (Fall.) (Syrphidae), female at *Oenanthe crocata* flowers, Buck's Mills, Devon, 15.vi.; *Sphaerophoria potentillae* Claussen (Syrphidae), male

from wet heath at Common Moor, East Putford, Devon, 11.vi.; *Chrysotoxum elegans* Loew (Syrphidae), The Tidna, Cornwall, 16.vi., males on *Rubus* flowers; *Triglyphus primus* Loew (Syrphidae), female and both sexes of *Cheilosia barbata* Loew (Syrphidae) at *Torilis japonica* flowers, edge of pine forest at King's Forest, Suffolk, 29.vii.; *Cheilosia chrysocoma* (Meig.) (Syrphidae), both sexes on hawthorn at edge of dune slack at Morfa Harlech, Gwynedd, 21.v.; *Xylota coeruleiventris* Zett. (Syrphidae), first East Anglian record from an area of mature Corsican pine, King's Forest, Suffolk, 27.v.; *Conops strigatus* Wied. (Conopidae), males on flowers of an exotic *Solidago* species, West Stow, Suffolk, 29.vii.; *Tanypeza longimana* Fall. (Tanypezidae) male on sycamore leaf in pine forest at King's Forest, Suffolk, 19.vii., close to site where second British example was collected in 1913; *Ectinocera borealis* (Zett.) (Sciomyzidae), Brownsham, Devon, female swept from edge of wooded stream, 15.vi.

STUBBS, A.E. — (a) Seven species new to the British List: *Limonia nigristigma* (Tipulidae), both sexes from Ashberry Pastures, Helmsley, N.W. Yorks., 25.viii.89, calcareous seepages, also recently recognized in collections from the Cheviots and Herefordshire; *Helius hispanicus* Lack. (Tipulidae), a male from a coastal landslip at Haven Cliff in the Axmouth–Lyme Regis N.N.R., Devon, 19.vi.89, only previously known from Spain; *Oxycera varipes* Loew (Stratiomyidae), a male also from Haven Cliff, a scarce mainly upland species in western Europe; *O. leonina* (Panz.) (Stratiomyidae), a female from East Walton, W. Norfolk, by a spring-fed calcareous stream, 6.vii.89, widespread in temperate Europe; *Sphaerophoria potentillae* Claussen (Syrphidae), also exhibited by I. Perry (q.v.), same data, only recorded before from N.W. Germany; *Cephalops chlorionae* (Frey) (Pipunculidae), a male from Boscombe, Dorset, *Phragmites* seepages on coastal cliffs, 24.vi.89, only previously known from four sites in Fenno-Scandinavia; *Dorylomorpha haemorrhoidalis* (Zett.) (Pipunculidae), a male from Blackpool Moss, Whitlaw Mosses N.N.R., Selkirk, 15.vii.88, the first true British example, previous records under this name referring to *D. hungarica* Aczél.

(b) a pair of *Didea alneti* (Fall.) (Syrphidae), collected by E. Simpson in Durham, very few have been seen in recent years.

(c) Nine other little known species: *Odontomyia angulata* (Panz.) (Stratiomyidae), female from East Walton, W. Norfolk, 6.vii.89, a pingo habitat likely; *Hybomitra muehlfeldi* (Brauer) (Tabanidae), female with same data as last, proving widespread in Norfolk; *Dioctria cothurnata* (Meig. (Asilidae), both sexes from Mapperton, Dorset, 21.vi.89, females with paler leg colouration than males are easily confused with *D. rufipes* (Deg.); *Syneches muscarius* (F.) (Empididae), both sexes from Winnall Moor, Hants., 25.vi.89, by ditches on grazing fields in the Itchen Valley, first record outside Dorset (where known from only two recent sites); *Neocnemodon brevidens* (Egger) (Syrphidae), a male from Denford, Berks. in valley fen, 13.vii.89, new county and first summer record; *Beckerias pannonicus* (Aczél) (Pipunculidae), male from same locality as *Syneches* above, this is on the British list as *Cephalops curtifrons* Coe, which is a synonym; *Sicus abdominalis* Kröber (Conopidae), males from Wicken Fen, Cambs., 8.vii.89 and Chobham Common, Surrey, 2.xi.1962 (exhibited with the common *S. ferrugineus* (L.) and another problem specimen from valley fen at Eddington, Berks., 10.vii.89; further study of this genus in Britain is necessary); *Cryptaciura rotundiventris* (Fall.) (Tephritidae), female from valley fen at Denford, Berks., 11.vii.89; *Cordilura aemula* Collin (Scathophagidae), male from East Walton, Norfolk, 6.vii.89.

COLEOPTERA

There were 16 beetle exhibits this year. They ranged from a single rather battered burying beetle with its accompanying mites exhibited by Mr Harley to the extensive array of specimens, larval skins and photographs shown by Professor Owen. Despite the large number of species shown by Mr Drane, he had solved all his transport problems by exhibiting them in a small transparent plastic box measuring not much larger than 8 by 6 inches! Nevertheless, they were all beautifully mounted, and mounted beneath the transparent lid within range of a hand lens. The Annual Exhibition is such an important forum for publishing Coleoptera records, that the following report is produced in its entirety. Exhibitors have, as usual, provided excellent and interesting data.

ALEXANDER, K.N.A. AND GROVE, S.J. — Mostly Cornish beetles found during the National Trust Biological Survey 1989 visit, with a few from private land. Those believed to be new to Cornwall are indicated by an asterisk. **Deleaster dichrous* (Grav.) frequent under stones on River Camel sandbank in Colquite Wood, 24.vi.89. *Trachys troglodytes* Gyll., widespread in W. Cornwall, this specimen on Devil's-bit scabious foliage, Kynance Cliff, 29.v.89. **Selatosomus bipustulatus* v. *tenebricans* du Buyss., the all black form, from spiderweb on old oak by River Fowey, Lanhydrock, 27.vi.89. *Malthodes guttifer* Kiesenw., swept in Dizzard Oakwood, 13.vii.89. **Rhizophagus nitidulus* (F.), in dead birch, Camerance Wood, Fal Estuary, 8.vi.89, and in dead oak, Ethy Wood, Lerryn, 14.vii.89. *Hyperaspis pseudopustulata* Muls., two beneath vegetation mats over rock outcrops, Beagles Point, Lizard, 28.v.89. *Halyzia sedecimguttata* (L.), found in three woods in east, this specimen from Cadsonbury, 22.vi.89. *Melandrya caraboides* (L.), from dead beech, Boconnoc Park, 24.vi.89. *Strangalia aurulenta* (F.), two on the wing, Boconnoc Park, same date. *Phyllobrotica quadrimaculata* (L.), numerous on skullcap in wet flush, Boconnoc Park, same date. *Calomicrus circumfusus* (Marsh.), swept from coastal heathland at Cambeak, Crackington Haven, 11.vii.89. *Cassida murraea* L., seen at three localities, this specimen from seacliff flush at Lower Predannack Cliff, Lizard, 14.vi.89. **Apion fuscirostre* (F.), from broom on cliffs at Crackington Haven, 11.vii.89. *Larinus planus* Germ., swept from flushed cliffland at Porthmeor, Zennor, 17.v.89 and elsewhere. *Mesites tardii* (Curt.), from dead oak in Trelissick Woods, 12.vi.89, and dead beech in Ethy Wood, Lerryn, 27.vi.89. *Smicronyx jungermanniae* (Reich), from dodder on western gorse at Lizard Point, 15.vi.89.

Material from other parts of Britain. *Phloiotrya vaudoueri* Muls., from dead oak near Cannop Ponds, Forest of Dean, new to W. Glos., 15.vii.89. *Zilora ferruginea* (Payk.), reared from pupa found in rotting pine, Abernethy, 6.viii.89. *Magdalis duplicata* Germ., beaten from pine foliage near Loch Alvie, 6.viii.89, both in Inverness-shire.

COLLIER, M.J. — Notable coleoptera records from Norfolk during 1988 and 1989. *Harpalus vernalis* (Duft.) Stanford, 8.v.88. *Cercyon laminatus* Sharp, Cranwich, 9.ix.89, first Norfolk record. *Nossidium pilosellum* (Marsh.), Wayland Wood, 16.vii.89, first Norfolk record since 1882. *Leiodes triepkii* (Schm.), Thetford, 3.viii.88, first Norfolk record since 1891. *Catopidius depressus* (Murr.), Stanford, 24.vii.88, first Norfolk record. *Colon appendiculatum* (Sahl.), West Harling Common, 25.v.88. *Neuraphes praeteritus* Rye, Grime's Graves, 11.vii.89, first Norfolk record. *Scydmoraphes helvolus* (Schaum.), Stanford, 2.iv.88. *Bledius filipes* Sharp., Cromer, 29.v.88. *Rugilis fragilis* (Graven.), Woodbastwick, 22.i.89 and Foulden, 12.iii.89, first record for West Norfolk. *Philonthus corvinus* Er., Stanford, 30.iv.89, first Norfolk record. *Bibloporus minutus* Raff., Great Hockham, 15.v.88, first Norfolk record. *Aphodius villosus* (Gyll.), Grime's Graves, 11.vii.89.

Onthophagus nuchicornis (L.), Stanford, 14.vi.88, first positive Norfolk record. *Cyphon pubescens* (F.), Stanford, 2.iv.88. *Epiphanus cornutus* Esch., Greak Hockham, 20.iii.88, first Norfolk and fifth British county record. *Laricobius erichsoni* Rosen., Stanford, 27.iii.89, first Norfolk record. *Ernobius pini* (Sturm), Thetford, 18.iv.88, second Norfolk record. *Anitys rubens* (Hoff.), Stanford, 2.iv.88, first Norfolk record. *Atomaria lohsie* Johns. and Strand, Thetford, 18.vi.88. *A. pulchra* Er., Stanford, 14.vi.88, first Norfolk record. *Platynaspis luteorubra* (Goeze), Stanford, 14.vi.88, first modern Norfolk record. *Corticaria alleni* Johns., Stanford, 2.iv.88, first Norfolk record. *Oncomera femorata* (F.), East Harling, 13.x.89, only modern Norfolk record. *Mantura chrysanthemi* (Koch), Stanford, 27.iii.88, first Norfolk record since 1906. *Chaetocnema arida* Foud., Stanford, 24.iv.88, first Norfolk record. *Ceutorhynchus pumilio* (Gull.), Thetford, 18.vi.88. *Tychius parallelus* (Panz.), Santon Downham, 21.v.89, first modern Norfolk record. *T. quinquepunctatus* (L.), Thetford, 18.vi.88, first modern Norfolk record. *Gymnetron beccabungae* (L.), Thompson Common, 19.ix.88, first Norfolk record.

COPESTAKE, D.R. — *Bagous limosus* (Gyll.), New Forest, 8.vi.88. *Henoticus serratus* (Gyll.), Wychwood Forest, 2.vii.89. *Aphthona herbigrada* (Curt.) *Apteropeda globosa* (Ill.), and *Gymnetron melanarium* (Germ.), from Swyncombe Downs, Oxon., 22.v.89. *Apion sedi* Germ., and *Anisoxya fuscula* (Ill.), from Merthyr Mawr Warren, Glam., vi.89. *Ceuthorrhynchidius thalhameri* Schultz, Ogmore by Sea, Glam., vi.89. *Ceutorrhynchus mixtus* M. & R., Stockgrove Country Park, Beds., 20.vi.89. *Lebia chlorocephala* Hoffman., near Waterperry Wood, Oxon., 21.ii.88. *Dryophthorus corticalis* (Schall.), 27.xii.88, *Teredus cylindricolis* (Ol.), 13.vi.88, *Grammoptera ustulata* (Schall.), 23.v.88 and *Ampedus cardinalis* (Schiodte) 10.iii.88, all from Windsor.

CRONIN, A.R. — A single stag beetle, *Lucanus cervus* (L.), found clinging to a lime tree, Shoreham, Sussex, vi.87.

DRANE, A.B. — *Bembidion pallidipenne* (Ill.), on sand, Midhurst Common, Sussex, 2.vi.89. *Tachys bistriatus* (Duft.), grubbing, Luccombe Chine undercliff. I.o.W., 6.v.89. *T. micros* (Waldh.), on mud, Eype Cliffs, Dorset, 4.vi.89. *T. scutellaris* Steph., under stone, Salthouse, Norfolk, 16.iv.89. *Pogonus luridipennis* (Steph.), under stone, Salthouse, Norfolk, 16.iv.89. *Drypta dentata* (Rossi), grubbing, White Cliff Bay, I.o.W., 31.v.87. *Actidium aterimum* (Mots.), river shingle, Doddington Bridge, Northumb., 4.vii.88. *Leiodes picea* (Panz.), under stone, Dorbach Burn, Inv., 27.vii.87. *Euconnus pragensis* (Machulka), red rot oak, Windsor, 29.xi.87. *Scydmaenus rufus* Mull., under beech bark, Branbourne Park, Berks., 1.iv.89. *Hadrognathus longipalpus* (M. & R.), in moss, Blints Quarry, Northumb., 1.vii.88. *Sunius* (*Hypomedon*) *debilicornis* Woll. farm hay debris, Helindon, Northants., 17.viii.89, new to Britain. *Plectophloeus nitidus* (Fairm.), red rot oak, Windsor, 2.viii.89. *Elodes tricuspis* Nybohm, beating by pond, Brampton Bryan Park, Here., 19.vi.81, second British specimen. *Eubria palustris* (Germ), sweeping, Eype Cliffs, Dorset, 4.vi.89. *Phloiophilus edwardsi* Steph., on lime branch, Rockhampton Park, Northants., 13.x.85. *Meligethes bidentatus* Bris., sweeping, Collyweston Quarry, Northants., 11.viii.89. *M. erichsoni* Bris., on horseshoe vetch, White Down, Surrey, 1.vi.89. *M. solidus* (Kug.), sweeping, Collyweston Quarry, Northants., 11.viii.89. *Monotoma bicolor* Villa, manure heap, Earls Barton, Northants., 3.ix.89. *M. longicollis* Gyll., *M. spinicollis* Aube, *M. testacea* Motsch., and *Cryptolestes pusillus* Schoenh., all in farm hay debris, Helindon, Northants., 17.viii.89. *C. confusus* Bruce, in beech log, High Standing, Berks., 11.iv.87, new to Britain. *Micrambe lindbergorum* (Bruce), on *Genista* sp., Collyweston Quarry, Northants., 31.vii.85. *Atomaria morio* Koll., in mole nest,

Rockingham Park, Northants., 15.iii.86. *Mycetophagus populi* (F.), rotton ash heart wood, South Wood, Northants., 26.iv.86. *M. quadriguttata* Mull., oak hollow debris, Branbourne Park, Berks., 10.vi.88. *Myrmechixenus vaporariorum* Guer., farm hay debris, Helindon, Northants., 15.viii.89. *Tetratoma ancora* F., on hornbeam, Crumps Wood, Sussex, 5.v.89. *Anthicus bifasciatus* (Rossi), manure heap, Newton, Northants., 30.ix.89. *Cryptocephalus bipunctatus* (L.), and *C. nitidulus* F., on birch, Hackhurst Down, Surrey, 1.vi.89. *Nanophyes gracilis* Redt., on *Pelis portula* L., Stedham Common, Sussex, 2.vi.89. *Otiorhynchus porcatus* (Herbst), grubbing, Blints Quarry, Cumber., 1.vii.88. *Strophosomus curvipes* Thoms., under heather, Studland, Dorset, 3.vi.89 *Tanymecus palliatus* (F.), sweeping, Eype Cliffs, Dorset, 4.vi.89. *Lixus scabricollis* Boh., under sea beat, Cockleshell Beach, Grain, Kent, 28.viii.88. *Rhinocyllus conicus* (Frol.) thistles, Eype Cliffs, Dorset, 4.vi.89. *Bagous czwalini* (Seidl.), pond vegetation, Battramsley Pond, New Forest, 29.vi.89. *Coeliodes nigritarsis* Hart., on young birch, Loch Garten, Inv., 6.viii.87. *Baris analis* (Ol.), on fleabane, Whitecliff Bay, I.o.W., 7.v.89. *Tychius quinquepuntatus* (L.), on bitter vetch, Croxton, Norfolk, 15.vi.89. *Ellescus bipunctatus* (L.), on sallow, Ashdown Forest, Sussex, 5.v.89.

EDMUNDS, H. — *Stenocorus meridionalis* (L.), inside a house, Cholderton Estate, near Salisbury. *Carabus nitens* L., crawling on heathland near Bloxworth, Dorset. *Blaps mucronata* Lat., in stables, Cholderton Estate, near Salisbury.

FOSTER, A.P. — Noteworthy species recorded in East Anglia during 1989. *Leiodes fulva* (Er.), a single male taken at m.v. light, Winterton Dunes, Norfolk, 23.x.89. *Adestemia watsoni* (Woll.) a synanthropic lathridiid taken in two widely separated wetlands, Walberswick, Suffolk, between 1 and 15.vi.89, two examples in water trap, and Chippenham Fen, Cambs., one in a pit-fall trap, between 2 and 16.vi.89. *Dienerella filum* (Aube), one in the same water trap as *A. watsoni*. *Trachys troglodytes* Gyll., three bred from larval mines, Badley Moor, Norfolk, 14.vi.89. *Hallomenus binotatus* (Quen.), one in an m.v. light trap, Brundall, Norfolk, 30.viii.89. *Aphthona euphorbiae* (Schr.), three from Woodbastwick, Norfolk, 3.viii.89 and found to be common in flax (*Linum catharticum* L.) fields in East and West Norfolk. *Longitarsus tabidus* (F.), two from *Verbascum pulverulentum* Vill., Whitlingham, Norfolk, 13.x.89.

FOWLES, A.P. — River shingle Coleoptera in Cardiganshire. In terms of abundance, two species — the elaterid *Zorochros minimus* (Bois.) and the carabid *Bembidion atrocoeruleum* Steph. — dominate the surface-active community and can be found on most shingle banks in good numbers. Other characteristic beetles include the ubiquitous hygrophile *Agonum albipes* (F.), several members of the genus *Bembidion* and a few staphylinids.

Bembidion punctulatum Drapiez, appears to occur only along the lowland stretches of the Cardiganshire rivers whilst *B. nitidulum* (Marsh.) inhabits shingle only at high altitudes (although it is frequent in other open-ground habitats in the lowlands). *Deleaster dichrous* (Grav.) is widely-distributed but only ever seen in small numbers whereas species such as *Lathrobium angusticolle* (Bois.) seem to be genuinely rare.

On the gravel-bed rivers of Cardiganshire there are several scarce beetles which live within the shingle bank matrix. Fine gravels support the greatest diversity and excavation can reveal the presence of a number of nationally uncommon species. The carabids *Clivina collaris* (Herbst) and *Perileptus areolatus* (Creutzer) usually occur just beneath the surface shingle layers but deeper down there is a distinctive group of tiny beetles that are adapted to life within the gravel-bed.

Many of the beetles which are prized as great rarities of the river shingle habitat are

probably fairly widespread in northern and western Britain but are merely overlooked. In the face of many threats to river systems more attention needs to be paid to the shingle fauna. With the present stage of knowledge it is almost impossible to evaluate which rivers are most deserving of conservation effort on behalf of their shingle invertebrates. For instance, prior to 1987 only one of the species displayed (*Brachygluta pandellei* (Saulcy)) had been recorded from Wales but recent studies have shown that at least *Coccinella quinquepunctata* L. and *Lionychus quadrillum* (Duft.) are common along the larger rivers of south-west Wales.

HALSTEAD, A. — Some local Coleoptera taken in 1989. *Dryops nitidus* (Heer), crawling on dunes, Braunton Burrows, N. Devon, 16.vi.89. *Dryophilus pusillus* (Gyll.), one male in Rothamstead light trap, RHS Garden, Wisley, Surrey, 31.v.89. *Grammoptera ustulata* (Schall.), on hazel leaf, Hoe Stream, Mayford, Woking, Surrey, 13.v.89. *Colydium elongatum* (F.), on oak log pile, Pamber Forest, Hants., 21.v.89. *Nacerdes melanura* (L.), crawling on garden soil, Knaphill, Woking, Surrey, 5.vii.89.

HARLEY, B. — A single specimen of *Nicrophorus investigator* Zett., from Big Strand, Islay, 21.viii.89. The beetle was injured, having lost the whole or part of several of its legs. It was carrying 320 adult mites and 90 smaller (possible immature) mites.

HENDERSON, M.K. — Specimens of dung beetles and diagrams from the recent monograph of Hallfter and Edmonds, showing the different patterns of nesting behaviour. These vary from a simple single tunnel to complex multiple 'nests'.

HODGE, P.J. — *Elaphrus uliginosus* F., Luccombe Chine, I.o.W., 3.v.87. *Bembidion decorum* (Zenk.), The Crumbles, E. Sussex, 14.ix.89. *Harpalus parallelus* Dej., Beachy Head, E. Sussex, 30.viii.89. *Licinus punctatulus* (F.), The Crumbles, E. Sussex, 15.ix.89. Laccobius sinuatus Mots., Totland, I.o.W., 14.v.89. *Leiodes rugosa* Steph., Lewes Downs, new to Sussex, 23.x.88. *Aclypea opaca* (L.), Westhay Moor, N. Somerset, 12.vi.89. *Neuraphes praeteritus* Rye, Lewes, E. Sussex, 7.vi.88. *Hypopycna rufula* (Er.), Lewes, new to Sussex, 27.ix.87. *Anotylus clypeonitens* (Pand.), Lewes, E. Sussex, 5.iv.87. *Oxytelus fulvipes* Er., Lewes, E. Sussex, 21.v.89. *Stenus oscillator* Rye, Colwyn Brook Marshes, Rad., 20.vi.88. *Tachyporus formosus* Matt., Whitecliff Bay, I.o.W., 31.v.87. *Falagria concinna* Er., Windsor, under oak log, 2.viii.89, new to Windsor. *Gynpeta ripicola* (Kiesenw.), Eridge Park. E. Sussex, 5.vii.88. *Atheta* (*Dilacra*) *difficilis* (Bris.), Ripe, new to E. Sussex, 17.iv.88. *Aegialia sabuleti* (Panz.), bank of R. Rother, Woolbeding, W. Sussex, 22.iv.88, new to S.E. England. *Geotrupes pyrenaeus* (Charp.), Hindhead Common, Surrey, 6.vi.88 *Heterocerus hispidulus* Kiesenw., The Crumbles, E. Sussex, 18.ix.89. *Dirhagus pygmaeus* (F.), Shapwick NNR, new to Somerset, 15.vi.89. *Anobium inexpectatum* Lohse, Lewes, E. Sussex, 21.v.89. *Anitis rubens* Hoffman, J.J., Windsor, 23.viii.89. *Dorcatoma dresdensis* Herbst, New Forest, 2.vi.89. *D. flavicornis* (F.), Bushy Park, Middx, from larva in fallen hollow oak, 16.x.88. *Malachius aeneus* (L.), Ashcott Corner, N. Somerset, 24.v.87. *Meligethes erichsoni* Bris., on *Hippocrepis comosa* L., Lewes Downs, new to Sussex, 18.v.89. *M. haemorrhoidalis* Forst., on *Lamium album* L., Lewes, E. Sussex, 10.v.89. *M. rotundicollis* Bris., on *Sinapis arvensis* L., Chattenen, W. Kent, 16.vi.88. *M. subrugosus* Steph., on *Jasione montana* L., Llansian, Caernarvon, 17.vi.87. *M. serripes* (Gyll.), on *Galeopsis angustifolia* Ehrh., Rye, E. Sussex, 26.v.87. *M. umbrosus* Sturm, on *Lamium maculatum* L., Shapwick NNR, new to Somerset, 13.vi.89. *Atomaria strandi* Johnson, Glynde, E. Sussex, 18.v.89. *Symbiotes latus* Redt., Lewes, new to Sussex, 6.ix.89. *Uleiota planata* (L.), Abbot's Wood, new to Sussex, 8.v.89. *Diaperis boleti* (L.), in *Polyporus squamosus* Fr. on *Populus nigra* L.,

Lewes, E. Sussex, 2.vii.89. *Donacia obscura* Gyll., Cwm Groynllyn, Rad., 23.vi.88. *Mantura chrysanthemi* (Koch.), Anelog, Caer., 17.vi.87. *Brachytarsus fasciatus* (Forst.), Windsor, 15.vii.89. *Apion cineraceum* Wenck., on *Prunella vulgaris* L., Lewes Downs, E. Sussex, 29.viii.88. *Polydrusus sericeus* (Schall.), Westhay Moor, new to Somerset, 12.vi.89. *Cossonus linearis* (F.), Lewes, E. Sussex, 27.iii.89. *Dorytomus hirtipennis* Bedel, Heigham Sound, E. Norfolk, 13.vii.87. *Ceutorhynchus rapae* Gyll., on *Sisymbrium officinale* (L.), Meare Heath, new to Somerset, 10.vi.89. *C. viduatus* Gyll., on *Stachys palustris* L., Shapwick NNR, new to Somerset, 14.vi.89.

Key, R.S. — *Dyschirius nitidus* (Dej.), Whitrigg NY2257, 27.vi.87. *Aepus marinus* (Strom), Lee Bay SS4746, 1.iv.89. *Trechus discus* (F.) Brotherscroft TF2744, 28.viii.89. *Asaphidion pallipes* (Duft.), Whitrigg NY2257, 27.vi.87. *Bembidion obliquum* Sturm, Haxey Grange Fen, SE7397, 17.v.87. *Bembidion humerale* Sturm, Crowle Moors SE7218, 4.viii.84. *Bembidion fumigatum* (Duft.), Haxey Grange Fen SE7397, 21.v.89. *Bembidion minimum* (F.), Dragonby SE9013, 2.viii.87. *Bembidion litorale* (Ol.), River Rye SE6182, 24.v.88. *Tachys parvulus* Dej. Crowland TF2309, 16.ix.89. *Pterostichus lepidus* (Leske), Hankley Common SU8841, 1.vii.89. *Pterostichus gracilis* (Dej.), Towyn Burrows SN3605, 17.vii.88. *Pterostichus oblongopunctatus* (F.), Bidcombe Wood ST8239, 24.iv.87. *Calathus ambiguus* (Payk.), Risby Warren SE9213, 2.viii.87. *Agonum nigrum* Dej., Cardurnock Flats NY1760 27.vi.87. *Agonum sexpunctatum* (L.), Chobham Common SU9665, 12.viii.87. *Amara fulva* (Muls.) Messingham Sand Quarry SE9003, 13.x.87. *Amara praetermissa* (Sahl.), Sandringham Warren TF6829, 30.vi.88. *Amara infima* (Duft.), Sandringham Warren TF6829, 30.vi.88. *Perigona nigriceps* (Dej.), Hallsannery SS4524, 30.iii.89. *Harpalus parallelus* Dej., Great Morton Sale TL0497, 16.vi.85. *Harpalus azureus* (F.), Crook Peak ST3855 25.iv.87. *Harpalus smaragdinus* (Duft.), Brean Down ST2939, 25.iv.87. *Stenolophus skrimshiranus* Steph., Cliffe Marshes TQ7378, 3.vi.87. *Acupalpus consputus* (Duft.), Monewdon TM2358, 10.v.89. *Licinus depressus* (Payk.), Colleyweston Quarry TF0003, 10.x.85. *Badister unipustulatus* Bonelli, Taumberland TF2638, 28.viii.89. *Badister dilatatus*(?) Chaud., (female), Cliffe Marshes TQ7378, 3.vi.87. *Panagaeus bipustulatus* (F.), Towyn Burrows SN3605, 17.vi.88. *Chlaenius vestitus* (Payk.), Crowland TF2309, 12.vi.88. *Chlaenius nigricornis* (F.), Marsland Valley SS2217, 5.vi.88. *Dromius sigma* (Ros.), Inkle Moor SE7017, 28.iv.85. *Dromius longiceps* Dej., Fairfield Pit TA0724, 1.viii.87. *Lionychus quadrillum* (Duft.), Llanwrda, R. Tywi SN7130, 14.iv.89. *Cymindis axillaris* (F.), Risby Warren SE9213, 2.viii.87.

Menzies, I. — Coleoptera from Ashtead and Bookham Commons, Surrey, all previously unrecorded or notable. The following from Ashtead Common. *Agrilus pannonicus* (Pill. & Mitt.) 4.vii.87, 13.vi.88, 3,9,12,20.vi.89, flying around dead oaks on sunny afternoons and sitting on adjacent vegetation. *A. sinuatus* (Ol.), 27.viii.79, 1.viii.87, beaten from hawthorn. *Opilo mollis* (L.), 16.vii.89, dead oak branch. *Lyxmexylon navale* (L.), 17,18.vi.89, 2.vii.89, males flying in numbers up to 10–20 round oak branches, females usually on trunks, both sexes rest on surrounding hazel and birch foliage. *Triplax aenea* (Schall.), 9.vi.89, in birch fungus. *Colydium elongatum* (F.), 20.v and 25.vii.87, under oak bark. *Pseudocistela ceramboides* (L.), 18.vi.88, beaten from hazel. *Lissodema quadripustulata* (Marsh.), 17.vi.89 fallen oak branch. *Rabocerus foveolatus* (Ljungh), 8.vii.89, fallen oak branch. *Orchesia minor* Walk., 15.vii.89, fallen oak branch. *O. undulata* Kraatz, 2.vii.89 on rotten oak trunk. *Abdera biflexuosa* (Curt.), 17.vi.89, fallen oak branch. *A. quadrifasciata* (Curt.), 18.vi.88, 12.vi.89, on fungi on dead oaks, fallen branches etc. *Phloiotrya*

vaudouri Muls., 28.vi.89, under oak bark. *Tomoxia biguttata* (Gyll.) 28.vi.87, 25.v.89, flying and running on oak trunks. *Grammoptera holomelina* Pool, 21.v.89, hawthorn blossom, *G. variegata* (Germ.), 24,25.v.87, hawthorn blossom. *Phymatodes alni* (L.), 30.v.87, fallen oak branch, present in large numbers in May and June during 1987 and 1988, but was absent in 1989. *Chalcoides nitidula* (L.), 23.ix.89, aspens. *Platystomos albinus* (L.), 30.vii.87 flying, 15.vii.89, oak branch. *Platypus cylindrus* (F.), 30.v.87, 3.iv.89, rotten oak.

The following were from Bookham Common. *Agrilus sinuatus* (Ol.), 20,28.vii.84, hawthorn. *A. viridus* (L.), 13,22.vi.88 on and flying around fallen sallow. *Phytoecia cylindrica* (Marsh.), 17,27.v.89 swept. *Zeugophora flavicollis* (Marsh.), 24.vi.51, 25.ix.88, 18.ix.89 on aspens. *Z. subspinosa* (F.), 1.vii.89 aspen saplings. *Chrysolina brunsvicensis* (Grav.), 20.x.88 on *Hypericum tetrapterum* Fr (*H. quadrangulum* auct.) and *H. perforatum* L. *Galeruca tanaceti* (L.), 27.viii.88 on low vegetation. *Chalcoides nitidula* (L.), 18.ix.89 mature aspen. *Chaetocnema arida* Foud., 12.x.89, swept. *C. confusa* (Boh.), 20.ix.89, swept from grass in heathy area. *Bytiscus betulae* (L.), 3.12.vi.88, aspen. *B. populi* (L.), 6.vi.53, 6.vii.86, 24.vi.88, 3.vi.89 mainly on aspen saplings. *Platypus cylindrus* (F.), 10.ix.88.

Nature Conservancy Council — An exhibit by the Coastal Shingle Invertebrate Survey Team showing the species of Carabidae recorded from Dungeness, Kent and Rye Harbour LNR, East Sussex during 1988 and 1989. From both localities were: *Trechus fulvus* Dej., *Stomis pumicatus* (Panz.), *Pterostichus macer* (Marsh.), *Calathus ambiguus* (Payk.), *Amara lucida* (Duft.), and *Panagaeus bipustulatus* (F.). From Dungeness only: **Omophron limbatum* (F.), **Dyschirius obscurus* (Gull.), *D. politus* (Dej.), *Bembidion pallidipenne* (Ill.), *Synuchus nivalis* (Panz.) *Bradycellus distinctus* (Dej.), *Stenolophus mixtus* (Herbst), *Licinus puntatulus* (F.), *Chlaeneus nigricornis* (F.), *Odacantha melanura* (L.), and *Dromius vectensis* Rye. From Rye Harbour only were: *Harpalus serripes* (Quen.), *Dicheirotrichus gustavi* Crotch, *Cymindis axillaris* (F.), and *Brachinus crepitans* (L.)

Owen, J.A. — Beetles bred from eggs or reared from larvae. *Licinus punctulatus* (F.), larva found eating a snail under a stone near Webbington, Somerset 18.v.87, the adult appeared on 30.vi.87. *Dytiscus dimidiatus* Bergstr., larva taken Wood Walton Fen June 1979, fed on worms, full-grown larva emerged from the water, climbed up a small mound of sand at one end of the tank and burrowed into it to pupate, adult appeared a few weeks later. *Melanotus punctolineatus* (Pele.) larva found in a sandy area near Deal in May 1986. Like most elaterids, this species has a short pupation period in late summer but the adult remains in the pupal chamber until the following year. *Hemicoelus nitidus* (Herbst), from a small maple log, Windsor Great park, February 1984. Two adults emerged August 1985. *Ptinus palliatus* Perris, reared from a fallen oak branch, Windsor Great Park, March 1988. Adult emerged June 1989, second record for Windsor. *Coccinella distincta* Fald., eggs obtained from a female captured Esher Common 13.v.85. Larvae fed mainly on rose aphids (*Macrosiphum rosae* (L.). Larvae stopped feeding on 8.vi.80, pupated a few days later and adults emerged on 24.vi.80, exactly five weeks after the eggs were laid. *Agrilus pannonicus* (Pill, & Mitt.) larvae collected in February 1985 in a piece of thick oak bark from a moribund oak tree in Windsor Great Park. The adults emerged on 10.vi.85. *Axinotarsus marginalis* Ol., larvae in a fallen oak log, Windsor Great

* Ironically, these two species which were Rye 'specialities' were not found at Rye during this survey. The gravel pits in which they occurred had overgrown and appeared to be no longer suitable. R.A.J.

Park, March 1988. Numbers of adults emerged in June of the same year. *Tomicus minor* (Hartig), reared from a small branch of Scots pine, Loch Garten, Inv., July 1978. *Leperisinus orni* (Fuchs) larvae in a small ash log, Cornwood, Devon, October 1986. *Polygraphus poligraphus* (L.), reared from a portion of a dead spruce from Windsor Great Park August 1984. *Anobium inexpectatum* Lohse, reared from stems of dead ivy, Blean Wood, April 1982. The adults appeared in June. *Opilio mollis* (L.), reared from a fallen oak branch, Windsor Great Park, March 1988. The adult emerged in June 1988. *Dorcatoma dresdensis* Herbst, reared from a hard fungus on a willow, Earith, Cambridgeshire, July 1975. The beetles emerged over the next 12 months. An example of *Opilio mollis* emerged from the same fungus. Presumably its larva had been feeding on the *Dorcatoma* larvae. *Mesites tardii* (Curt.), larvae present in a piece of dead ash Mull, August 1970. *Molorchus minor* (L.), larvae in a portion of a dead spruce tree collected in May 1985. The adults emerged in May the following year. *Leptura scutellata* F., larva in a dead beech trunk in Windsor Forest. March 1985. The adult emerged in July. *Stragalia maculata* (L.), larva in a small branch of (?) beech in the middle of a woodants nest, Harewood Forest, March 1989. The adult emerged in June. The black marking on the specimen are much more extensive than in the typical form. *Bolitophagus reticulatus* (L.), reared from its usual habitat, the fruiting body of *Fomes fomentarius* from a dead birch, Glen Garry, Inv., July 1989. *Prionychus melanarius* (Germ.), larva from a rotten elm stump, Norton, Glos., July 1984. Adults emerged June 1985. *Pytho depressus* (L.), larva from under bark of Scots pine, Loch an Eilein. Inv., July 1985. Adults emerged August 1985. *Xylita laevigata* (Hellenius), larva from a very rotten standing Scots pine, Loch an Eilein, Inv., June 1986. Adult emerged July 1986. *Cteniopus suphureus* (L.), larva found under a stone on cliff-top grass, Lizard, Cornwall, June 1989. *Ischnomera cyanea* F., larva in damp, rotten beech at Mickleham, Surrey, May 1989, adults overwinter in pupal chambers. *Ampedus nigrinus* (Herbst), larva found in a stump of Scot's pine, Loch an Eilein, Inv., May 1989. *Procraerus tibialis* (Bois. & Lac.), larva in an old beech stump, Windsor Great Park. The larvae of this species are frequently associated with the weevils. *Stereocorynes truncorum* (Germ.) and *Rhyncolus lignarius* (Marsh.) on whose larvae they probably prey. *Gnorimus nobilis* (L.), from eggs laid by a wild female captured in the New Forest on a flower head of *Heracleum sphondylium* L. in July 1986. The larvae were kept in a plastic bucket holding sections of hard, though somewhat rotten, plum wood. Adults appeared in June 1988. They immediately mated and laid eggs from which a second captive generation is now being reared. *Gnorimus variabilis* (L.), reared from wild larvae kept in hard red heart-wood of oak. Eggs laid in July 1987 by some of the reared adults gave rise to larvae most of which are still (October 1989) growing but one produced an adult in June 1989. *Schizotus pectinicornis* (L.), flattened larvae live under bark of recently dead birch trees and fallen branches. They appear to feed on detritus or mould. The specimen was reared in dryish, rotten birch wood in a glass container. *Pseudocistela ceramboides* (L.), larvae resemble meal-worms. They live in rot-holes of oak, beech and other deciduous trees and are readily reared in the same way as elaterid larvae. *Prionocyphon serricornis* (Mull.), aquatic larvae often found in the pools which form at the roots of large trees, eating detritus formed from dead leaves. A culture was kept for several years through a number of generations in a pail containing a few inches of water with dead leaves and an emergent piece of wood for pupation. *Phytodecta polaris* Schneid., larvae live on the leaves of the dwarf willow *Salix herbacea* L. Eggs are laid in July and larvae are to be found in August. *Chrysolina crassicornis* (Helliesin) (= *latecincta* (Demaison)), eggs laid on *Plantago maritima* L. on which the beetles were feeding in the wild. The resulting larvae were

fed on *Plantago lanceolata* L. as this was more easily obtained. Pupation occurred at the end of June and adults emerged during the first two weeks of July.

The larvae of the elaterids (click-beetles) are better known than those of most beetles families moreover, those associated with rotten wood are relatively easy to rear. In most cases the beetles were reared in wood mould or soil essentially as described by the exhibitor (*Entomologist's Rec. J. Var.* 1986; **98**: 90. *Ampedus cardinalis* (Schiodte), larvae live in red-rotten oak. They have a somewhat roughtened, slightly rounded, cone-shaped terminal segment which is typical of most of the other British *Ampedus*. *Ampedus ruficeps* (Muls. & Guill.), larvae have a smooth, almost cylindrical terminal segment with a hemi-spherical end. The larvae live mainly in well-rotted ancient oaks often in the lining of cavities in trunks and large boughs. *Elater ferrugineus* L., largest elaterid found in Britain. The larvae are distinguished by the smooth, slightly tapering cone-shaped terminal segment. They are carnivorous and, in captivity, eat small worms and the larvae of *Dorcus*. *Limoniscus violaceus* (Muller), larvae have a flattened terminal segment with forked apical cerci (arms) almost enclosing a small circular space. (Note: this species is now scheduled under the Wild Life and Countryside Act and cannot be collected in any stage or studied in the wild or in captivity except under licence.) *Ischnodes sanguinicollis* (Panz.), larva resembles typical *Ampedus* species but has a terminal segment shaped as a linear, pointed cone. The adult was reared from a larva found at Windsor, February 1988 in wood mould below a bird's nest in a hollow beech tree — a typical habitat. *Megapenthes lugens* (Redt.), larvae resemble typical *Ampedus* species but end in a short, trifid spine. The adult was reared from a larva found at Windsor in February 1988 in rotten wood lining a cavity in a large section of fallen beech tree. The larva, with others, was living in wood containing colonies of the weevil *Stereocorynes truncorum* (Germ.) and it is likely that the *Megapenthes* larvae were preying on the weevil larvae. *Melanotus erythropus* (Gmel.), larva has a flattened terminal segment, ending in a blunt point with smaller bumps on either side. This is the commonest elaterid breeding in dead wood. *Agypnus murinus* (L.), terminal segment has a very characteristic shape. The predatory larvae of this species live in dry, chalky or sandy soil. *Harminius undulatus* (Deg.), a northern species whose larvae live under thick bark of dead, usually fallen birch trunks. The larvae have a flattened terminal segment, with branched cerci almost enclosing a small hole. *Lacon querceus* (Herbst), larvae are unlike other wood-inhabiting elaterids in that they are not chitinized except for the head and part of the first segment. They have well developed mandibles and live in dry, flaky, rotten oak wood, often associated with larvae of *Mycetophagus piceus* (F.) and on which the larvae of *Lacon* probably prey. *Ctenicera cuprea* (F.), like those of the preceeding species, larvae have a flattened terminal segment, ending in a pair of infuscate, divergent, stout cerci almost enclosing a round space. The inner cerci has a short keel. They live in damp soil in hilly districts, up to altitudes of 3500 ft.

HEMIPTERA

ALEXANDER, K.N.A. AND GROVE, S.J. — Two rare Cornish bugs, *Lasiacantha capucina* Germ., the thyme lace bug, previously known only from Kynance Cove and Sennen Cove, W. Cornwall, but this year found widely from Beagles Point to Helston, W. Cornwall and most importantly at Nare Head, E. Cornwall. *Emblethis verbasci* (F.), known on mainland Cornwall only from Sennan Cove — the source of this specimen, 29.vi.89, other localities being the Scilly Isles and Sandwich Bay, Kent.

HAWKINS, R.D. — Some Heteroptera from home and abroad. *Arma custos* (F.), beaten from trees by a lake, West Germany, 16.vi.89. One of the predatory shield bugs of the Amyoteinae, resembling *Troilus*. *Orsillus depressus* Dallas, specimens bred from nymphs from Lawson's cypress in Surrey and compared to those collected in Spain. *Eurydema ornatum* (L.), from Spain. This species varies tremendously, and for accurate identification, the wings must be slightly raised to check the patterns on the abdomen. *Rhacognathus punctatus* (L.), from Surrey heathland. *Eurydema oleraceum* (L.), from Surrey and Berkshire. *Deraeocoris scutellaris* (F.), from Surrey heathland.

HODGE, P.J. — *Placochilus seladonicus* (Fall.), on *Knautia arvensis* (L.), Beachy Head, new to Sussex, 18.vii.89. *Capsus wagneri* Remane, Shapwick NNR, new to Somerset, 14.vi.89.

HYMENOPTERA

Ants, bees, wasps, sawflies, etc. have been poorly represented at the exhibition in recent years. The summer of 1989 should have been ideal for many of these insects and indeed there were more Hymenoptera exhibits than usual, although the order remains very much a minority interest. Identification difficulties are presumably the reason why the parasitic hymenoptera receive such little attention and are rarely displayed at the exhibition.

ALEXANDER, K.N.A. AND GROVE, S.J. — Two scarce ants collected in Cornwall during 1989. These were *Leptothorax tuberum* (F.) from Lower Predannack Cliff, W. Cornwall, 21.v.89, and Nare Head, E. Cornwall, 4.vii.89, and *Myrmecina graminicola* (Lat.) from The Strangles, Crackington Haven, 11.vi.89.

ARCHER, M. — Some local or rare aculeate wasps and bees taken in recent years in Yorkshire, the Isle of Wight and other areas. Pompilidae: *Agenioideus cinctellus* (Spin.), infrequent, Luccombe Cliffs, I.o.W., August 1988; *Aporus unicolor* Spin., local, Sark, Chan. Is., July 1989; *Arachnospila minutula* (Dahlbom), infrequent, Risby Warren, S. Humber, August 1985; *Priocnemis susterai* Haupt, infrequent, this record extends its northwards range to Sherwood, Notts., May 1987–89. Sphecidae: *Argogorytes fargei* (Shuck.), rare, several burrows in a vertical clay river bank exposed to sunlight, Keswick Fitts, W. Yorks., June–July 1988–89. Andrenidae: *Andrena alfkenella* Perkins, rare, The Duver, I.o.W., July 1988; *A. nitidiusculus* Schenck and *A. pilipes* F., both rare, at Red Cliff, I.o.W., August 1988. Halictidae: *Lasioglossum angusticeps* (Perkins), rare, second confirmed record from I.o.W., at Luccombe Cliffs, August 1988; *Sphecodes miniatus* von Hagens, first confirmed record for Watsonian Yorkshire, collected W.D. Hincks, June 1951, at Spurn, N. Yorks. Anthophoridae: *Nomada fucata* Panz., cleptoparasite of the local bee *Andrena flavipes* Panz., at Beaulieu Heath, New Forest, July–August 1984–88; *N. lathburiana* (Kirby), cleptoparasite of the local bee *Andrena cineraria* (L.), at Barnaby Dun, S. Yorks, April–May 1987.

FALK, S.J. — The exhibitor showed a selection of mostly unnamed insects, including many aculeate hymenoptera, collected in Kashmir and Nepal in October–November 1987 and Crete in April 1989. A second drawer contained some notable aculeates collected in Britain in recent years. Pompilidae: *Auplopus carbonarius* (Scop.), Brownsham, N. Devon, 17.vi.89. Eumenidae: *Ancistrocerus antilope* (Panz.) with its cleptoparasite *Chrysis pseudobrevitarsis* Linsenmaier (Chrysididae) at Brownsham, N. Devon, 17.vi.89; *Symmorphus crassicornis* (Panz.), Pembrey Forest, Carm., 6.viii.85. Sphecidae: *Crossocerus binotatus* Lep. & Brullé, Wicken Fen, Cambs., 8.vii.89; *C. walkeri* (Shuck.), Stanford, W. Norf., 21.viii.85;

Passaloecus eremita Kohl, Ambersham Common, W. Sussex, bred from pine bark, 1988; *Psen spooneri* (Richards), Hams Hall Power Station, War., 8.vii.87 — this record is well outside its usual south eastern range. Colletidae: *Colletes marginatus* Smith, F., Tywyn Burrows, 17.vii.88 and Pembrey Forest, 6.viii.85, both Carm. Andrenidae: *Andrena trimmerana* (Kirby), Slapton Ley, S. Devon, 17.iv.85 and Rame Head, Corn., 15.iv.85; *A. humilis* Imhoff, Pillaton, E. Corn., 27.v.89 and Wembury, S. Devon, 1.vi.89; *A. argentata* Smith, F., with its cleptoparasite *Nomada baccata* Smith, F., Horsell Common, Surrey, 4.viii.87; *A. proxima* (Kirby) with its cleptoparasite *Nomada conjungens* H.-S., Slapton, S. Devon, 28.v.89; *A. congruens* Schmiedeknecht, Midhurst Common, W. Sussex, 24.iv.85 and West Heath Common, W. Sussex, 23.iv.85; *A. tibialis* (Kirby), Mousehold Heath, E. Norf., 22.v.89; *A. fulvago* (Christ), Wilmington Down, E. Sussex. 30.vii.88, Hartland Quay, N. Devon, 16.vi.89 and Milverton, S. Som., 10.vi.89; *A minutuloides* Perkins, Stanford, W. Norf., 21.viii.89. Halictidae: *Lasioglossum xanthopus* (Kirby), Stanground, Cambs, 3.v.89; *L. rufitarse* (Zett.), Castle Morris, Pemb., 10.viii.85; *L. quadrinotatum* (Kirby), Stanford, W. Norf., 21.viii.89. Melittidae: *Macropis europaea* Warncke, Wicken Fen, Cambs., 8.vii.89. Megachilidae: *Osmia bicolor* (Schr.), Barnack N.N.R., Northants, 31.iv.89. Anthophoridae: *Nomada hirtipes* Pérez, Windsor Forest, Berks, 9.vi.89; *N. pleurosticta* H.-S., Arlington Court, N. Devon, 12.vi.89, and Pillaton, E. Corn. with its host *Andrena humilis* Imhoff, 27.v.89. Xylocopidae: *Ceratina cyanea* (Kirby), Levin Down, W. Sussex, bred from bramble stems, 1988, and similarly from Rewell Wood, W. Sussex. Apidae: *Bombus ruderatus* (F.), Dungeness, E. Kent, 4.viii.88 and Stanground, Cambs, 2.v.89.

FOSTER, A.P. — Two specimens of the sphecid wasp *Rhopalum gracile* Wesm. taken during an N.C.C. fen survey in East Anglia. They were collected in a water trap set between 5.vii and 12.viii.88 at Catfield Great Fen, Norfolk. Further specimens have been subsequently seen and this local species, previously known from Cambs. and Suffolk, is clearly established at this site.

HALSTEAD, A.J. — Two exhibits featuring sawflies and other Symphyta. The first consisted of examples of damage caused by the larvae of certain distinctive species likely to be found in gardens, together with an information sheet and pinned specimens of the adults. Comparatively little is known about the biology of Britain's sawflies and the purpose of the exhibit was to gain information during 1990 about the distribution of 16 species that can be readily identified from the nature of the damage caused and a description of the larvae. Anyone wishing to assist in the survey should send an S.A.E. for the information sheet to the exhibitor, c/o R.H.S. Garden, Wisley, Woking, Surrey, GU23 6QB.

The second exhibit was of some local or rare sawflies, wood wasps and a cuckoo wasp mostly taken in 1989 by sweeping. Xiphydriidae: *Xiphydria prolongata* (Geoff.), R.S.P.B. Reserve, Fowlmere, Cambs., 2.vii.89. Cephidae: *Hartigia xanthostoma* (Evers.), swept by S. Grove at Marshall Farm, near Woodfordisworth, N. Devon, 14.vi.89; *H. nigra* (Harris), River Lew, near Hatherleigh, N. Devon, 12.vi.89; *Janus femoratus* (Curt.), Pamber Forest, Hants, 21.v.89. Cimbicidae: *Trichiosoma lucorum* (L.), swept by R. Crossley at Whiteleigh Meadows, N. Devon. 12.vi.89. Argidae: *Sterictiphora geminata* (Gmel.), Hoe Stream, Mayford, Woking, Surrey, 13.v.89. Tenthredinidae: *Aneugmenus temporalis* (Thom.), swept from bracken, R.H.S. Garden, Wisley, Surrey, 6.vii.89; *Strongylogaster macula* (Klug), swept from bracken, R.H.S. Garden, Wisley, Surrey, 17.v.89; *Periclista pubescens* (Zaddach), swept from oak, R.H.S. Garden, Wisley, Surrey, 10.v.89; *Allantus melanarius* (Klug), very scarce, Box Hill, Surrey, 25.vi.89; *Macrophya rufipes* (L.), Therfield Heath, Royston, Herts, 30.v.89; *Monophadnoides ruficruris* (Brullé),

Pamber Forest, Hants, 21.v.89; *Nematinus williglkiae* (Stein), R.H.S. Garden, Wisley, Surrey, 30.vi.89; *Pristiphora abbreviata* (Hartig), on pear leaf, R.H.S. Garden, Wisley, Surrey, 9.iv.89. Chrysididae: *Chrysogona gracillima* (Forst.), on a dead standing oak trunk, R.H.S. Garden, Wisley, Surrey, 23.vi.88.

HAWKINS, R.D. — A photograph of the solitary wasp *Oncomelus* (*Odynerus*) *melanocephalus* (Gmel.) (Eumenidae) at the entrance to its tunnel. In June 1989 the exhibitor had visited a former gravel quarry near Lübeck, West Germany. A solitary wasp was observed entering its nest via a short mud tunnel built above the burrow in flat ground. About 10 minutes later the wasp was captured in a tube as it emerged from its nest. Its identity was confirmed by the exhibitor's friends, Wolfgang and Jane van der Smissen, who had not previously recorded it at this site. Further lengthy observations of another specimen enabled Wolfgang to obtain the photograph exhibited. *O. melanocephalus* has Red Data Book status 2 in the West German Red Data Book and its presence in the quarry may strengthen the case for protecting the site against threatened agricultural improvement.

KNIGHT, G. — An active nest of the social wasp *Vespula vulgaris* (L.) in a sealed clear plastic container. The nest had been dug out of a compost heap earlier in the summer and rehoused in the container. A series of colour photographs showed the wasps as they repaired and enlarged the nest in subsequent weeks. Also exhibited were some aculeate hymenoptera taken in Devon and elsewhere in 1989. The more notable species were *Andrena fulvago* (Christ) taken on coastal cliffs at SS2224, N. Devon, 28.vi.89, *Bombus muscorum* (L.) and *Oxybelus argentatus* Curt., both taken at Braunton Burrows, N. Devon, 16.vi.89; a specimen of the sphecid wasp *Ectemnius cavifrons* (Thom.) taken on 2.x.89, which is about 2 months later than its usual season.

MORRIS, R. — Two local aculeates taken in Surrey. Eumenidae: *Eumenes coarctatus* (L.), Bisley, 29.vii.89. Chrysididae: *Hedychridium coriaceum* (Dahlbom), Mitcham Common, 30.vii.88 and 20.viii.88. The latter is a cleptoparasite of the sphecid wasp *Lindenius albilabris* (F.).

A second exhibit showed the results of an N.C.C. funded study of ants at Dungeness in 1989. Ants were recorded with the use of pitfall traps and the study showed that the greatest numbers of ants were to be found in the areas with well established vegetation, such as broom and other shrubs. The species recorded included *Myrmica schencki* Emery, *M. specioides* Bond., *Leptothorax tuberum* (F.), *L. interruptus* (Schenck) and *Stenamma westwoodi* Westw.

ORAM, D.A. — Two specimens of the ichneumon wasp *Alolophion occidentalis* collected in the Falkland Islands, together with a Falkland Islands postage stamp depicting the same species.

SIMMONS, M.J. — Some sawflies and other Symphyta taken on or near a footpath running through a deciduous wood and leading to an area of sweet chestnut coppice with oak standards at Eynsford, Kent, in 1988–89. These were Pamphiliidae: *Neurotoma saltuum* (L.); *Pamphilius balteatus* (Fall.). Argidae: *Arge cyanocrocea* (Forst.). Tenthredinidae: *Rhogogaster chlorosoma* (Benson); *Tenthredo mesomelas* L.; *T. livida* L.; *T. northa* (Taeger); *T. celtica* Benson; *T. marginella* F.; *T. arcuata* Forster; *Pachyprotasis antennata* (Lep.); *P. rapae* (L.). These are widespread species but *N. saltuum* and *P. balteatus* are infrequently seen as adults.

DICTYOPTERA

PARSONS, M. — A specimen of the cochroach, *Rhyparobia maderae* F. This cosmopolitan pest species was found in an old banana box, 11.v.89, at Ninfield, E. Sussex.

Neuroptera

Menzies, I. — A photograph of the hook-tipped lacewing, *Drepanepteryx phalaenoides* (L.). The specimen was collected by beating holly under old oaks at Bookham Common, Surrey, on 11.iii.89. This is a scarce species which is infrequently recorded although it is widely distributed.

Plant, C. — Two species of scarce lacewings of the family Hemerobiidae taken in Rothamsted light traps. A female *Hemerobius contumax* Tjeder was taken at Cockayne Hatley, Sandy, Beds. in September, 1988. Specimens of *Drepanepteryx phalaenoides* (L.) were taken at Chopwell Wood and at Hamsterley Forest, both near Bishop Auckland, Co. Durham, during May 1988.

Orthoptera

Oram, D.A. — A specimen of a camel cricket, *Paradenus falklandicus*, collected in the Falkland Islands, together with a Falkland Islands postage stamp showing the same species.

Illustrations

Barrington, R. — A water colour painting of *Apatura iris* (L.) (purple emperor butterfly) sipping fluid from a discarded coca-cola can. Photographs of *Pararge aegeria* (L.) (speckled wood butterfly), *Lysandra coridon* (Poda), (chalk-hill blue butterfly), the robber fly *Asilis crabroniformis* L. and a pair of *Zygaena filipendulae* (L.) (six-spot burnets) in copula.

Bradford, E.S. — One finished colour plate covering several genera of the series on the Gelechiidae. A further series of water colour drawings of various species, to be included in future colour plates were also displayed.

Collins, G. — The Surrey Insect Recording Scheme, Macrolepidoptera survey. Distribution maps showing details of the recording scheme currently being compiled, illustrating eight species of moth which are restricted by geology or habitat type.

Collins, G., Morris, R. and Hawkins, R. — A series of panels indicating the various recording schemes being run by the Croydon Natural History Society. Groups covered comprised the Macrolepidoptera, Orthoptera, Odonata, certain Diptera and Hymenoptera, plus ladybirds and sheildbugs. A request for records was addressed to all entomologists.

Copestake, D. — A sequence of 11 cibachrome prints of Coleoptera and Syrphidae. One notable photograph showed a specimen of *Dytiscus circumcinctus* F., a rare water beetle found in a New Forest pond. Another depicted *Donacia crassipes* F. on a lily pad near the edge of a lake in north Wales. The hoverfly photographs included a pair of *Eristalis* spp. with the male in hovering display above the female, plus two *Helophilus* spp. mating. Other pictures figured *Strangalia maculata* (Poda), *Lilioceris lilii* (Scop.), *Cionus schrophulariae* (L.). *Ctenopius sulphureus* (L.) and *Nebria livida* (L.).

Hawkins, R. — A scheme for recording ladybirds and shieldbugs in Surrey, to which all entomologists are invited to contribute records.

Henderson, M. — An interesting series of black and white drawings of dung beetle life cycles, showing the excavation and construction of nest and brood chambers as well as of nesting behaviour. A drawer of the beetles portrayed in the illustrations accompanied the exhibit.

Menzies, J. — Photographs of the uncommon lacewing *Drepanepteryx phalaenoides* (L.), (hook-tipped lacewing), also the beetle *Agrilus viridis* L. found on Bookham Common Surrey, in June 1988. The characteristic 'sunbathing' position

adopted by the beetle was revealed, as well as a number of emergence holes made by the adults in a nearby tree trunk.

MURPHY, F. — Fourteen striking photographs of S.E. Asian spiders, including one of *Gasteracantha arcuata* taken by M.W.F. Tweedie.

NATURE CONSERVANCY COUNCIL — A stand headed 'Our approach to invertebrate conservation'. The stand displayed a variety of maps and photographs of habitats and species, together with the question 'Why are invertebrates so difficult to conserve'? Reasons were advanced to explain the difficulty one is confronted with when attempting the conservation of insects. Invertebrate conservation leaflets were available to members.

WARING, P. — A number of photographs demonstrating the progress of work on some of the protected moths of Britain, including outdoor breeding cages used for captive rearing projects. Also shown were pictures of damage to potential sites for *Thetidia smaragdaria* (F.) (Essex emerald moth) caused by sea-wall construction, maintenance, and by fires. Photographs taken on two field meetings run by the Society at Woodwalton Fen in June 1989 were also exhibited.

BENHS FIELD MEETINGS

Sotterley Park, Suffolk, 13 May 1989

Leader: **A.P. Foster**. Six members attended this day time meeting on a rather windy, though mainly sunny day. Despite the presence of a large number of standing, old pollard oaks, the dead wood invertebrate fauna proved somewhat disappointing. Doubtless, this was in part due to our visit being just too early in the season for the hawthorn blossom to be fully out. In addition, very little fallen timber had been left in situ to sample.

A few species associated with dead wood habitats were recorded, including the hoverflies *Brachyopa scutellaris* Rob. — Des. and *Criorhina berberina* (F.). The death watch beetle, *Xestobium rufovillosum* (Deg.) was also noted.

Cirencester Park Woods, Gloucestershire, 30 September 1989

Leaders: **Keith Alexander and Ian Carter**. The ancient semi-natural woodlands of the Cirencester Park Estate have recently been found to have a very rich and interesting invertebrate fauna, and sections have been selected for a proposed site of special scientific interest.

The morning was spent in the Haines Ash Bottom area of Oakley Wood (SO 973042) where there is a good concentration of large oak and beech trees and the woodland is less disturbed by modern forestry activities. One of the first flies taken by Peter Chandler was the Red Data Book-listed *Paraclusia tigrina* (Fall.) — new to Gloucestershire. Rare fungus gnats followed: *Keraplatus testaceus* Dalman and *Mycetophila mitis* (Johannsen). Amongst the beetles found were *Ctesias serra* (F.), *Mycetophagus atomarius* (F.) and *Cerylon fagi* Bris., the last new to the site. The ancient woodland snail *Zenobiella subrufescens* (Miller) was numerous amongst stands of dog's mercury.

After lunch, we moved on to Dorvel and Hen Woods, along the steep south-west-facing slopes of the nearby valley of the River Frome, near Sapperton (SO 949040). The effects of this summer's drought were more evident here and limited the catch. The snail *Zenobiella subrufescens* was again present, together with the much rarer *Ena montana* (Draparnaud) – a Cotswold speciality. The fly list was rather short but included another Cotswold speciality, the fungus gnat *Exechiopsis magnicauda* (Lund.). Leaf mines of the agromyzid *Liriomyza pascuum* (Meig.) were noted on its host wood spurge. Coleoptera included *Apion pallipes* Kirby and *Siagonium quadricorne* Kirby. The grand total of fungus gnats for the day was 38 species.

ANNOUNCEMENTS

NATURAL HISTORY BOOKS STOLEN FROM THE SOCIETY'S LIBRARY

Following the removal of the Society's Library into storage on the 11th and 12th of December 1989 it was reported to the President that a number of books bearing the Society's library stamp had been offered to a London bookseller on the 21st of December.

The books concernrd were:–

British butterflies and their transformations by J. O. Westwood
The genera and species of British butterflies by H.N. Humphreys
The genera and species of British moths by H.N. Humphreys
The flowering plants, grasses and ferns (in six volumes) by Anne Pratt

There may, however, be other books missing too. It is likely that the Society will have to undertake a full stock-take at the removal firm's premises shortly. All of the books listed above bear either the BENHS or SLENHS book labels on the inside cover. Some of the coloured plates may also be rubber-stamped.

Members are asked to keep an eye out for any of our books being sold. If any are found members are also asked to:–

(1) Note down the circumstances of their sale including the book seller's name and address.

(2) If at all possible you should hold on to the books and inform the seller that you believe the books to be stolen. (However you should not take the books away with you from the seller's premises. Nor should you attempt to purchase the books.)

(3) Next you or the bookseller should contact the police, the details of the case should be given to them when they arrive.

Once the bookseller has been informed that the books are stolen he or she must not sell them on. It would be an offence to do so.

The case number for this event is B 3266 which is being dealt with by W.P.C. Smith at Staines, Middlesex police station. It would also be helpful if members would get in touch with me if such a situation as above occurs:–
Stephen Miles (Hon. Librarian) 0784 252274 (home).

A Somerset Moth Group has been formed with the purpose of recording and mapping the macrolepidoptera of the county (the modern county excluding parts of Avon formerly in Somerset). Lists of Lepidoptera recorded by visiting entomologists will be very welcome.

For recording forms and further details please contact Ian Bolt, 1 Ashford Road, Wellington, Somerset TA21 8QF. Tel: 0823 662554.

BRITISH JOURNAL OF ENTOMOLOGY AND NATURAL HISTORY

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Contributions must be double-spaced with 3cm margins either side to facilitate marking up. They should be typed if possible, on one side only of A4 paper. Layout should follow that of the journal, but apart from underlining scientific names, no marks should be made to define typeface.

Line and continuous tone figures are accepted. Writing on figures is best listed separately for setting and its placing indicated on a duplicate figure. Seek advice before drawing. Reduction may otherwise necessitate redrawing.

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are held regularly and the well-known ANNUAL EXHIBITION and ANNUAL DINNER are planned for the 27th October 1990 at Imperial College, London SW7.

Frequent Field Meetings are held at weekends in the Summer. Visitors are welcome at all meetings.

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OLD FOREST INSECTS NOTED FROM SOME BERKSHIRE PARKLANDS

S.J. Grove
The National Trust, Spitalgate Lane, Cirencester, Glos. GL7 2DE.

During the spring and summer of 1988 I carried out a brief survey of some 20 parklands in Berkshire for the Nature Conservancy Council (NCC) to assess their interest for wildlife, chiefly for invertebrates associated with mature woodland. Some parklands, those which have an unbroken continuity of old trees stretching back centuries, are known to be important refugia for relict 'old forest' communities (Harding & Rose, 1986). The survey concentrated on parks of known interest for old forest lichens, based on a survey by Bowen (1988), and on parks with mediaeval origins as listed in Cantor (1983). In most cases, a single visit only was made to each park, in April or May, but those with obvious potential were visited more often, and later into the season, and the most promising sites were visited several times. Malaise traps and water traps were also used at two of the most promising sites, though in general these added little information on the presence of old forest species (in the taxa examined) to that already gleaned by the general collecting techniques (beating, sweeping and direct examination of timber and flowering hawthorns) used throughout. Nearly all the parks visited are in private ownership and lack public access, and anyone intending to visit them should approach the owners beforehand. This would best be done through the NCC county officer, by whom the initial contacts for this survey were established.

The list of parks that follows is accompanied by records of the old forest Coleoptera (*sensu* Harding & Rose, 1986), ancient woodland hoverflies (*sensu* Stubbs & Falk, 1986) and other woodland insects of interest for their generally acknowledged association with mature woodland noted during the survey, with a few additional records as indicated. From the list of old forest Coleoptera, an 'index of ecological continuity' (EIC) has been calculated for each park using the method described by Alexander (1988) whereby the presence of a Harding and Rose strong indicator (H1) species scores 3 points, a good indicator (H2) scores 2 and a weak indicator (H3) scores 1; the EIC is the sum of these scores. Alexander suggests that an index of 20 or more indicates a site of national importance, though adds that if a single visit produces an index of 6 or more then the site has considerable potential. Of the 20 parks surveyed, 13 appear to have no interest for old forest Coleoptera, six have some interest. Only Englefield Park appears to be a site of great interest, though on current information it does not appear to be of national interest, despite the presence of two Red Data Book (Shirt, 1987) species, *Tomoxia biguttata* (Grll.) and *Grammoptera ustulata* (Schall.). Englefield is the only one of the 20 parks surveyed that Harding (1978) included in an inventory of parks of likely conservation value for the invertebrate fauna the mature woodland, based largely on some early 20th century records from 'Bradfield'. Of the six species of interest recorded then (*Abraeus granulum* (Er.), *Cicones variegata* (Hell.), *Ischnodes sanguinicollis* (Panz.), *Oxylaemus variolosus* (Duf.), *Ptenidium gressneri* (Er.) and *Pediacus dermestoides* (F.)), only the last of these was found during the present survey; it is not clear whether this reflects a genuine extinction, though this seems at least possible given the small number of large old stumps present in the park today. Wasing Park is the second highest scorer, though it took several visits to reach this rather low IEC. It has one Red Data Book species, *Grammoptera ustulata*. The point that perseverence may be

needed even in the better parks is well illustrated here, since on the first visit Wasing did not produce a single old forest species, though the habitats present and its history suggested that it ought to support species of interest, as it clearly does. In general, it would be wrong to conclude, in the absence of a high IEC, that a site is not important for old forest species, unless there is evidence of lack of suitable habitat or unfavourable history. What one can be sure of is that high-scoring sites are important for old forest species.

The list of ancient woodland hoverflies provides an interesting comparison, since if a similar index were calculated based on this group, a very different ranking would result, with, for instance, Welford Park and Aldermaston Court coming out at the top of the league instead of well down it. This probably reflects the differing habitat requirements of the two groups: in general terms, the hoverflies listed are those that favour damper areas with more semi-natural habitat than a scatter of over-mature parkland trees can provide, rich though such areas can be for Coleoptera. All but *Didea fasciata* (Macq.) are thought to breed in damp timber. The parks with long lists of ancient woodland hoverflies are those with mature trees in damp valleys or along rivers, providing adequate continuity of damp timber. Thus an index based on Coleoptera is probably most suitable for open parkland with scattered trees, whereas one based on hoverflies might be more appropriate for true woodlands and other well-wooded sites.

It is worth noting that there is not an automatic correlation between parks that are valuable for old forest lichens and those that are valuable for old forest invertebrates. This is well illustrated in Berkshire, where the better parks for lichens are largely in the less polluted west of the county, though none of these western parks were found to be of great interest for the invertebrates. In contrast, Englefield Park, further east, is considered by Bowen to be of only local conservation value for lichens, though it is clearly the most valuable of the parks surveyed for invertebrates. It also appears that lichens are capable of surviving in small fragments of mature timber habitat that seemingly do not support diverse assemblages of invertebrates, for instance Chilton and Woolley Parks, both of which are considered to be of regional lichenological importance.

Aldermaston Court. Mediaeval parkland (earliest ref. 1202) with remnants of 17th c avenues. Now with scattered ancient hollow oaks amongst ungrazed bracken and scrub, areas of more formal parkland, and belt of woodland. 12 visits, IEC = 1. Coleoptera: *Pediacus dermestoides* (F.) (H3), common in recently felled mature oak. Syrphidae: *Chalcosyrphus nemorum* (F.) common in sallow carr areas; *Criorhina asilica* (Fall.), several on hawthorn blossom; *Criorhina berberina* (F.), common on hawthorn blossom; *Criorhina ranunculi* (Panz.), one on hawthorn blossom; *Didea fasciata* (Macq.), one on hawthorn blossom; *Xylota florum* (F.), one in sallow carr. Also *Lasius brunneus* (Latr.) (Hym: Formicidae) on one tree in 17th c oak avenue.

Basildon Park. Eighteenth century landscape park, garden and woodlands, now with very few old trees and many exotics scattered amongst improved park grassland. 2 visits, IEC = 1 (but *4). Includes *records from National Trust Biological Survey, 1986. Old forest Coleoptera: **Sinodendron cylindricum* (L.) (H3); **Ctesias serra* (F.) (H3); **Pyrochroa coccinea* (L.) (H3); *Phymatodes testaceus* (L.) (H3). Ancient woodland Syrphidae: *Brachyopa* sp., one (not caught) on beech trunk; **Brachypalpoides lenta* (Meig.); *Ferdinandea cuprea* (Scop.), one on beech trunk; **Xylota sylvarum* (L.). Also *Lasius brunneus* (Latr.) (Hym: Formicidae) on the only old oak tree; **Ctenophora pectinicornis* (L.) (Dip: Tipulidae).

Benham Park. Eighteenth century landscape park and garden of mediaeval

origin (earliest refs 1086 and 1349). Now with very few old trees and a few exotics scattered amongst improved park grassland. 2 visits, IEC = 0. Only species of interest was *Allochernes wideri* (Koch) (Pseudoscorpiones), one in woodmould of recently fallen ash.

Caversham Park. Remnants of 17th century park surrounding 19th century house. Mediaeval in origin (earliest ref. 1223). Now with no old trees and partly built over. 1 visit, IEC = 0. No species of interest.

Chilton Park. Open parkland of uncertain origin, now with very few old trees and many exotics scattered amongst improved pasture. 2 visits, IEC = 0. No species of interest.

Denford Park. Remnants of parkland of uncertain origin, with a few old trees, now partly in agricultural use. 1 visit, IEC = 0. No species of interest.

Donnington Grove. Eighteenth century landscape park and garden, now with a few old trees, mostly in agricultural land, and in wooded riverside area. 1 visit, IEC = 0. Ancient woodland Syrphidae: *Chalcosyrphus nemorum* (F.), very common around waterlogged alder logs by river; *Criorhina berberina* (F.), one on hawthorn blossom; *Criorhina ranunculi* (Panz.), one on hawthorn blossom; *Xylota sylvarum* (L.), several around waterlogged alder logs by river.

Elcot Park. Wooded gardens and open pasture of uncertain origin, now with few old trees. 1 visit, IEC = 0. Ancient woodland Syrphidae: *Xylota sylvarum* (L.), one on foliage in garden.

Englefield Park. Medieval park (earliest ref. 1588), still with areas of wood pasture stocked with fallow and red deer. Areas of mature trees but some recent timber removal. 11 visits, IEC = 16. Old forest Coleoptera: *Sinodendron cylindricum* (L.) (H3), several in damp-rotted stump; *Ampedus elongatulus* (F.) (H3), one swept from beneath old beech pollard; *Stenagostus villosus* (Fourc.) (H3), larvae common in logs, one adult beaten from oak foliage; *Pediacus dermestoides* (F.) (H3), common under bark of fallen oak and beech; *Triplax aenea* (Schall.) (H3), one under bark of year-old cut beech stump; *Mycetophagus atomarius* (F.) (H3), several under bark of fallen beech; *Bitoma crenata* (F.) (H3), common under bark of fallen oak and beech; *Prionychus ater* (F.) (H3), larvae presumably of this species in rotting stumps; *Pyrochroa coccinea* (L.) (H3), one beaten from old sweet chestnut, *Pyrochroa* sp. larvae common under bark of fallen beech; *Tomoxia biguttata* (Gyll.) (H1), several flying and running around year-old cut beech stump; *Ischnomera cyanea* (H3), one beaten from oak foliage; *Grammoptera ustulata* (Schall.) (H1), one beaten from oak foliage. Ancient woodland Syrphidae: *Chalcosyrphus nemorum* (F.), one on old log; *Criorhina berberina* (F.), one on hawthorn blossom; *Ferdinandea cuprea* (Scop.), one on buttercup; *Xylota sylvarum* (L.), one on recently cut stump. Also *Lasius brunneus* (Latr.), commonly beaten from hawthorns and oak foliage; *Ctenophora pectinicornis* (L.), one ovipositing in splits in bark of fallen oak.

Inholmes Park. Open parkland of uncertain origin, with few old trees and some exotics, mostly amongst improved pasture. 1 visit, IEC = 0. No species of interest.

Midgham Park. Wooded gardens and open parkland of uncertain origin, now with few old trees and some exotics, mostly in agricultural land. 1 visit, IEC = 0. Ancient woodland Syrphidae: *Criorhina ranunculi* (Panz.), one on hawthorn blossom.

Park Place. Late 18th century landscape park and gardens on medieval site (earliest ref. c1250), now with very few old trees and largely in agricultural use. 1 visit, IEC = 0. *Ctenophora bimaculata* (L.) (Dip: Tipulidae), pupa in woodmould at base of hollow stump of old horse chestnut.

Prospect Park. Nineteenth century park developed around 18th century house,

now with no old trees and many exotics, and mostly given over to recreation grounds. 1 visit, IEC = 0. No species of interest.

Sandleford Priory. Remains of early 18th century landscape park developed around 13th century priory, now with few old trees in Priory grounds; rest of park now returned to agriculture. 1 visit, IEC = 0. No species of interest.

Swallowfield Park. Remains of 18th century parkland developed around 17th century house on mediaeval site (earliest ref. 1232). Now with few old oaks in agricultural land. 2 visits, IEC = 4. *Tillus elongatus* (L.) (H3), one in rotting small branch of old oak; *Silvanus unidentatus* (Ol.) (H3), one under bark of recently cut oak log; *Pseudocistela ceramboides* (L.) (H2), one beaten from oak foliage. Ancient woodland Syrphidae: *Ferdinandea cuprea* (Scop.), one on hawthorn blossom. Also *Lasius brunneus* (Latr.), colony in one old oak.

Wasing Park. Original house and gardens developed in 18th century; parkland may be older. Now with few old oaks in parkland and agricultural land. 7 visits, IEC = 6. Old forest Coleoptera: *Sinodendron cylindricum* (L.) (H3), one under loose bark of old oak; *Melasis buprestoides* (L.) (H3), one swept from beneath old oak; *Thanasimus formicarius* (L.) (H3), one on trunk of old oak; *Grammoptera ustulata* (Schall.) (H1), one beaten from old oak foliage. Also *Lasius brunneus* (Latr.), colony in one old oak.

Welford Park. Open parkland of uncertain origin. Now with no old trees in improved pasture, but with well wooded riverside. 3 visits, IEC = 1. Old forest Coleoptera: *Pyrochroa coccinea* (L.) (H3), one on foliage below old beech. Ancient woodland Syrphidae: *Brachyopa* sp., larvae in slimy sap-run on old horse chestnut; *Brachypalpoides lenta* (Meig.), one on hawthorn blossom; *Chalcosyrphus nemorum* (F.), common around riverside trees; *Criorhina berberina* (F.), several on hawthorn blossom; *Criorhina floccosa* (Meig.), one on hawthorn blossom; *Didea fasciata* (Macq.), one on hawthorn blossom; *Ferdinandea cuprea* (Scop.), one on rotten log; *Xylota sylvarum* (L.), several around recently cut sycamore log. Also *Ctenophora bimaculata* (L.), one swept from trunk of beech pollard, and one pupa found in rotten beech log.

Whiteknights Park. Open parkland of uncertain origin. Now with few old trees, though fringe well wooded; parkland partly given over to recreation grounds. 1 visit, IEC = 0 (but *3). *Record (1975–86) from Biological Records Centre at Reading Museum. Old forest Coleoptera: **Tomoxia biguttata* (Gyll.) (H1).

Woolhampton Park. Medieval parkland (earliest ref. 1304). Now with few old trees, and many exotics, mostly in improved pasture. 1 visit, IEC = 0. No species of interest.

Woolley Park. Parkland (formerly deer park) of uncertain origin. Now with very few trees apart from a few beech pollards in woodland belt. 1 visit, IEC = 0. Ancient woodland Syrphidae: *Criorhina berberina* (F.), one on foliage near old beech pollards.

Acknowledgements

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BOOK REVIEWS

Butterflies and day-flying moths of Britain and Europe, by Michael Chinery. 322pp with over 1600 colour figures, Collins new generation guide, 1989, hardback £12.25, paperback £9.00.

This book is a successor to the widely known *Field guide to the butterflies of Britain and Europe* in its many editions from 1970 to 1980, by L. G. Higgins and N. D. Riley, and to its up-dated and expanded version by Lionel Higgins and Brian Hargreaves published in 1983. Hargreaves has been responsible for the artistry of the colour figures in all of these previous books and also, with other artists, for most of those in this new book. Despite its connection with its predecessors, this book differs in many respects besides the addition of the day-flying moths. The text is strictly confined to the British Isles and western and southern Europe as far as the Soviet Republics of Russia, the Ukraine and Romania. It therefore makes no mention of some 34 species and about as many sub-species found only in Africa north of the Sahara or the Canary Islands, Madeira or the Azores, which were previously listed, presumably because they belong to the same western Palaearctic fauna as those in Europe. A foreword by Sir David Attenborough and the author's preface state its broad aim of giving to general naturalists both a guide to the identification of species and a fuller understanding of the lives and behaviour of butterflies and moths. To that end more than two-thirds of the book are devoted to description and illustration by colour figures. Separate sections describe their origins and evolution, physiology and transformation from eggs to adults, hibernation and migration etc. There is also a useful two-page glossary and an index which contains, rather uncomfortably, both vernacular and scientific names, the latter arranged under the genera used in the text but without mention of forms or varieties discussed in the text.

The core of the book, 174 pages, lists 355 species of butterflies and about 220 moths

selected from many different families. A brief account of each family is followed by the species, with vernacular names in capital letters and scientific generic and specific names in small type following, with many abbreviated notes describing adults, habitats, and flight periods. In many species there are also brief accounts of some or all of the earlier stages. Under the heading 'Status' a series of letters indicate abundance or rarity and need for conservation in various countries. The very small distribution maps are printed in red and the many colour figures of adults and often of ova, larvae and pupae are fitted into the text on the same or opposite pages. A triangle before a name indicates that the species is found in the British Isles: 65 butterflies are so marked. In many cases a note concludes with page references to those special sections where often information about the species can be found.

It should be noted that the order in which species are here listed differs somewhat from that used in 1983, and there are a number of differences in the scientific genera. Six species which were then stated to occur in Europe are now omitted. These are *Towares nogelii*, Nogel's hairstreak, which is local in the Romanian Dubruja, the Cretan grayling (*Hipparchia cretica*), Descimon's ringlet (*Eredia serotina*), previously doubtfully given specific rank but now believed to be the result of hybridization, the American painted lady (*Cynthia virginiensis*), the plain tiger (*Danaus chrysippus*), the desert orange-tip (*Colotis evagore nouna*), which are known to be capable of breeding at least temporarily in the Iberian peninsula.

The selected day-flying moths are treated similarly, but are more heavily weighted by British species. There is a good assemblage of colour figures of both British and Continental species, many of which are not readily available elsewhere, especially of some of the Microlepidoptera.

The strength of the book lies in its wealth of excellent colour figures. The text may be too packed with detail and complicated in arrangement to attract the general naturalist, while the specialist in Lepidoptera can be provoked by some of its omissions and, in the special sections, by its failure to give authorities for its dogmatically stated conclusions about cause and effect.

R. F. BRETHERTON

PSILOTA ANTHRACINA MEIGEN AND OTHER SCARCE DIPTERA IN WARWICKSHIRE (VC38)

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diptera recording in Warwickshire continues to produce unexpected finds, even amongst comparatively well studied groups such as Syrphidae. Several species new to the County have recently been found in this, and other, families.

Psilota anthracina Meig. is a small, Merodontine syrphid, whose distribution is largely confined to the ancient woodlands of southern England (principally the New Forest and Windsor Forest), although there is also a recent record for South Essex. Its status on a national scale is considered vulnerable. The capture of a specimen attracted to the blossom of rowan (*Sorbus aucuparia* L.) in old deciduous woodland at Ryton Wood, SP3872, (female, 22.v.1989, A. Wright) represents a considerable northerly extension to its previously recorded distribution in England.

Ryton Wood, SP3872, has also provided recent records of two other scarce syrphids new to the County; *Cheilosia nebulosa* Verrall (2 males, 10.iv.1987, A. Wright) was taken hovering low to the ground in a somewhat damp ride. Although the sun was shining, the temperature was still decidedly cool. *Ferdinandea ruficornis* (F.) has appeared on at least two occasions in Ryton Wood (2 males, 14.vii.1985, A. Wright/C.J. Palmer; female, 29.iv.1987, A. Wright). Specimens were taken around trees, but no recent evidence of *Cossus cossus* L. in Ryton Wood exists. *Criorhina ranunculi* (Panz.), previously only known from Austy Wood SP1762 in Warwickshire (28.iii.1948, K.G.V. Smith) has been seen at Ryton Wood (females, 27.iv.1987 and 25.iv.1988, both A. Wright) and at Brandon Wood, SP3876 (female, 28.iv.1989, A. Wright).

Several other notable Syrphids have recently been found in Brandon Wood, SP3976, a site where 118 species of hoverfly have been recorded over the past 5 years, (Wright, 1988). *Brachyopa pilosa* Collin, thought at the time of publication of *British hoverflies* by Stubbs & Falk (1983) to be largely restricted to Windsor Forest, the New Forest and Surrey, was taken on 14.v.1988 (a male, D.J. Mann), hovering in a somewhat overgrown ride. *B. pilosa* has recently been shown to be more widely distributed than originally thought, but the above record provides an interesting addition to the Warwickshire fauna.

The first post-1980 Warwickshire records for *Melangyna arctica* (Zett.) (2 females, 11.v.1989, A. Wright; male, 23.v.1989, A. Wright) and *Pipiza fenestrata* Meig. (male, 14.v.1988, A. Wright) were also from Brandon Wood. A suspected *Cheilosia chrysocoma* (Meig.) visiting flowers of *Sorbus aucuparia* L. eluded capture at this site, although this species has been added to the County fauna on the basis of a specimen from the margin of Wellesbourne Wood, SP2653 (male, 26.iv.1989, R. Langdon). Mr Langdon reported seeing three or four individuals, hovering at about head-height, stopping periodically to rest on the leaves of adjacent trees.

Neoascia interrupta (Meig.), only added to the British list in 1981, has a distribution centred on south-east England and the fens, thus a specimen at Stonebridge Meadows LNR, Coventry SP3475 (female, 13.v.1987, S.A. Lane) represented a considerable extension to its range. Several other wetland hoverflies of note have been recorded recently in the county, particularly at Sutton Park SP0998. *Orthonevra geniculata* Meig. was recently recorded for the first time this century at this site, specimens of both sexes being swept from sedges around Longmoor Pool (26.iv.1988, J. Piekarczyk). The species was also encountered in better numbers

during sweeping at Little Bracebridge Pool (11.v.1989, R.J. Barnett and A.C. Barlow).

Platycheirus perpallidus Verrall was also taken by sweeping marginal vegetation at Little Bracebridge Pool, fair numbers of this insect being found in May and June 1988 (J. Piekarczyk, A. Wright, D.J. Mann).

Chrysogaster macquarti Loew. appears to be present as a stable population at this site. Having been found around Longmoor Pool during 1986 by S.G. Ball, this species was also in evidence at Little Bracebridge Pool in both 1987 and 1988 (A. Wright). A much less expected find was the occurrence of *C. macquarti* at Wyken Slough, Coventry SP3683. The site consists of a large, somewhat invertebrate-poor pool, with a small (110×80m) marshy area to the north. It was from this latter area that a male was captured on 7.vii.1988 (A. Wright). The site is surrounded by close-mown grass and pasture land, and the M6 motorway is less than 300 yards away. The scarce stratiomyid *Vanoyia tenuicornis* (Macq.) was found to be present at the same site, being swept from reeds (male and 3 females, 7.vii.1988, A. Wright).

In terms of Stratiomyids, Herald Way Marsh SSSI, Coventry proved to be an extremely productive site, recently producing three species new to the county, as follows: *Vanoyia tenuicornis* (Macq.) (female, 22.vi.1988, A. Wright); *Oxycera nigricornis* Ol. (female, 22.vi.1988, A. Wright); *Praomyia leachii* (Curt.) (male, 22.vi.1988, D.J. Mann).

The rare *Oxycera morrissii* (Curt.) is also present at this site, being found in both 1987 and 1988 (S.A. Lane, R.J. Barnett). The tipulid *Nephrotoma crocata* (L). was recorded at this site in both 1987 and 1988 (S.A. Lane), and the muscid *Dialytina atriceps* (Loew) was found here by S.G. Ball in 1988. *D. atriceps* is a rare fenland species unexpected so far from its traditional haunts. Sadly, despite its SSSI status, it seems virtually certain that this excellent invertebrate site will undergo industrial development in the near future.

A further hoverfly new to Warwickshire, *Cheilosia griseiventris* Loew was taken at Bishop's Hill, Bishops Itchington, SP3958 (male, 3.viii.1989, A. Wright). On the same day, two specimens of the conopid *Thecophora fulvipes* R.-D. were swept from an area of calcareous grassland at this site (D.J. Mann).

The rare Dolichopodid *Systenus pallipes* (von Roser) was encountered at Sutton Park SP0998 in some woodland near Little Bracebridge Pool (18.vi.1988, S.G. Ball). The fly had been attracted to a sap run on oak. The rare empid *Oedalea apicalis* Loew was swept at Brandon Wood, SP3876, (male, 14.vi.1989) A.C. Barlow. *Chrysops viduatus* F. was added to the county lists on the basis of a specimen from Stockton Quarry (male, 14.vi.1987, D.J. Mann).

The scathophagid *Scathophaga decipiens* Hal. has a centre of distribution based around south-east England, although there are scattered records as far west as Pembrokeshire and as far north as Perthshire. Specimens swept at Coombe Park SP4080 (male, 2 females, 16.xi.1988, A.C. Barlow) were an addition to the county fauna. Only about a dozen post-1960 records of this fly are currently on file. A male *Sphaerophoria* keying to the 'form A' of Stubbs & Falk was taken by the author of CAD Kineton, SP34, on 1st August 1989. The taxonomic status of this form remains as yet unresolved.

Voucher specimens for all the above, with the exception of material collected by S.G. Ball, are retained in the collections of the Herbert Art Gallery and Museum, Coventry. I wish to thank Stuart Ball, Tony Barlow, Ray Langdon and Darren Mann for permission to include their records. Stuart Ball also provided additional distribution data for some species, for which I am most grateful.

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BOOK REVIEW

Local lists of Lepidoptera or a bibliographical catalogue of local lists and regional accounts of the butterflies and moths of the British Isles by J.M. Chalmers-Hunt. Hedera Press, 1989, £21.00.

For those involved in drawing together information on the Lepidoptera of a given area, for whatever reason, a bibliography of existing local lists is long overdue. Even for researchers in the well-worked families which form the butterflies it can be a nightmare uncovering all available existing information. Earlier works by other authors have come part way to filling the gap. For Ireland, *A bibliography of Irish entomology* (Ryan *et al.*, 1984) included many references to the Lepidoptera (I reviewed this work in *The London Naturalist* **65**: 100 (1986)). A year earlier *A bibliography of the entomology of the smaller British offshore islands* by Smith & Smith (1983) had plugged a gap in an equally poorly recorded area. However, the present work appears to be the first, at least during the present century, to cover this single order of insects for the entire British Isles.

The author, Michael Chalmers-Hunt is, to say the least, a well known lepidopterist and all round naturalist. His knowledge of the British butterflies and moths is second to none and in particular his *magnum opus* on the butterflies and larger moths of his home county of Kent, published in parts as a supplement to the *Entomologists' Record and Journal of Variation*, bears testament to this. He is also a past President of the British Entomological and Natural History Society. As well as being a serious collector of Lepidoptera he is also an avid collector of books and papers on the subject and in the reviewer's opinion there is no man, or woman, alive today better suited to produce the work presently reviewed. He places his own library last in his list of resources, though one inevitably suspects that he has drawn rather more heavily on this than modesty permits him to reveal.

Some 30 years of work have been involved in producing this bibliography of 3137 titles (the numbers rise to 3161 but 24 numbers were accidentally omitted from the original typescript), which cites all county and regional lists and local accounts of British Lepidoptera known, though lists containing relatively few species have generally been omitted. Local lists often contain information of considerable interest to a wide readership, though because of the way in which many local lists were, and still are, compiled these data have never been published in the major journals. Such local lists, particularly manuscript works, are frequently difficult to obtain and are certainly unlikely to be chanced upon by the general researcher. It is therefore particularly valuable to have a bibliography which not only lists the works but also includes a note on where they may be examined.

The bulk of the work is an alphabetically arranged list of references, much as would be found at the end of any scientific paper. Each entry is numbered and

annotated with a county abbreviation. The second section of the book is an alphabetic list of county headings, together with their abbreviations as used earlier, under each of which are arranged, in order, the entry numbers of the references relating to that geographical area. This simple, straightforward approach, with no attempt to complicate matters by introducing weird and wonderful cross-referencing systems, makes the book extremely easy to use.

Of course, checking the accuracy of such a work is extremely difficult requiring access to the same library sources used in the preparation of the book. Whilst the author will no doubt expect the law relating to the inhabitants of the city of Sodom to operate by means of the reviewer finding fault in the first reference checked, the present reviewer has not been so lucky and it was some time before an error was located. Even then this may be typographical in nature and I have singularly failed to find any others. I refer to entry 1273 which incorrectly places Hartlebury Common in Warwickshire (it is in Worcestershire) and yes, the error is continued to the county section too.

As far as checking a particular county is concerned I can only talk with any degree of knowledge about the London area which, for my present purpose can be narrowed down to Middlesex. Under this heading I find 71 entries of which, pleasingly, three were unknown to me as Lepidoptera recorder for the vice-county. On the negative side, however, there are a number of apparent omissions. Whilst the *Transactions of the City of London Entomological and Natural History Society* has clearly been searched, (witness entry 2767 — Tautz, P.H. 1914. Notes on the Lepidoptera of the Pinner district), I cannot seem to find, by way of example, Bell, S.J. 1902. Holiday notes from Hunstanton (pages 28–32) or Picket, C.P. 1902. Notes on an August holiday at Folkestone (pages 33–35) in the same journal. Both of these works contain several species references and I would have thought that they qualified for inclusion. Perhaps there is a numeric 'cut-off point' of which I am unaware. Returning to the London area again, the biennial reviews of the capital's Lepidoptera produced by the late Baron de Worms (listed under 'W' not 'd'), covering 1961 to 1977 and published in *The London Naturalist* are absent except for the one covering 1966 and 1967 which was published in *Proc. Trans. Br. Ent. Nat. Hist. Soc.* **1 (2)**: 113–123 (entry number 3137). Interestingly enough, the reviews covering 1978 to 1984, which were authored by the reviewer, are listed (entries 2332, 2333 and 2335), though my review for the following two years is absent, in spite of appearing in 1987.

My only other criticism of this most valuable volume is beyond the control of the author. It is the price. Presumably such a work has a limited sales audience but the book contains no colour work other than the two-tone blue dust-jacket and the paper used, though stout and presentable has a 'rough' feel about it and I suspect that it is not from the top end of the market. In spite of this, and the omissions mentioned above (which are to an extent inevitable in a work of this size and complexity), I have no hesitation in suggesting this book as a most essential item for anyone in any way concerned with the distributions of Lepidoptera species in this country.

C.W. PLANT

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OBITUARY

Edward Charles Pelham-Clinton (1920–1988)

With the sudden death on Christmas Day 1988 of Teddy Pelham-Clinton we lost one of our best known and most distinguished members. His interest in Lepidoptera began at an early age when he lived in Somerset and was greatly stimulated whilst he was at Eton under the guidance of Nigel Wykes. It was there, with the late Denzil Ffennell, that he worked out the system of recording that makes his collection and notebooks such a significant and unique contribution to the study of Lepidoptera in Britain.

Teddy joined the Society, then the 'South London', in 1940 in his 20th year. In the war he served in the Royal Artillery reaching the rank of Captain. After that he read zoology at Cambridge and engaged in much collecting in that area. He moved to Edinburgh in 1951 to join the Agricultural Research Council's ectoparasite unit based at Edinburgh University and later the Moredun Research Institute.

By then his entomological enthusiasms were quite wide and as well as Lepidoptera he was actively collecting caddisflies, sawflies, fleas and some families of beetles in his spare time. In Edinburgh his first professional commitment was to flies of vetinerary importance and, with J.A. Campbell, he published a revision of the British species of *Culicoides* in 1960. At the same time he was engaged in the mass sampling of various other groups of flies, and also delving into world Ceratopogonidae, but the unit became entirely redirected towards helminthology and his work as a dipteran taxonomist no longer received support. Teddy refused to make such a radical change, however, and successfully negotiated the right to work on dung-associated beetles on the grounds of their relevance to helminthology.

In 1960 Teddy was recruited as an Assistant Keeper to the staff of the Royal Scottish Museum (now subsumed into the National Museums of Scotland) by Rodger Waterston, then keeper of natural history, whose interests in entomology were mainly directed towards Odonata, Neuroptera, Hemiptera and aculeate Hymenoptera. Teddy's interests in Lepidoptera, Diptera, Trichoptera, Siphonaptera and Coleoptera were an extraordinarily apt match, and there followed a period of considerable curatorial advance in the Museum.

In turn Teddy curated the Museum's British collections of fleas, several families of calyptrate flies, caddisflies, and sawflies — all the time adding to them substantially by enthusiastic collecting and incorporating his own pre-existing material. He then switched his main attention to Lepidoptera, but here faced an unfortunate dilemma. He wanted to continue to make his own collection of British Lepidoptera but felt that he should voluntarily adhere to the rules operating in the BM(NH). These forbade employees to collect privately the groups on which they worked, in order to diminish possible conflicts of interest. Giving up his own collection was out of the question, but he saw moral salvation in his decision not to work directly on the museum's British Lepidoptera. Instead he concentrated on the exotic holdings, bringing curatorial order to what had been a very chaotic accumulation of material. At the same time he encouraged donations and organized a good deal of collecting overseas, especially of Pyralidae (on which at one time he had hoped to specialize) and other Microlepidoptera. It was also to avoid any suspicion of a conflict of interests that he scrupulously avoided doing fieldwork in Britain in the museum's time or at its expense — although he continued to collect insects other than Lepidoptera for the museum as a byproduct on all his holidays.

Teddy's wide knowledge of insects and his dual role as both professional and amateur brought him many friends and contacts, and his high curatorial standards

persuaded many notable entomologists to bequeath their collections or contribute material in their lifetimes to the museum. In particular some large collections of British Lepidoptera came in, including those of Arbuthnot, Ffennell (duplicates), Johnson (with exotics), Mackworth-Praed (micros only), Macnicol, Mere, Poore, Richardson, Weddell and de Worms (with exotics). After his retirement as deputy keeper of natural history in 1981, when he moved to Axminster in Devon, Teddy at last saw himself free to work on this material and twice each year he returned to Edinburgh to do a fortnight's voluntary curation. He had amalgamated the various collections as far as Gelechiidae by the time of his death.

Despite his breadth of entomological interest Teddy's main industry throughout his life was the study of British Lepidoptera, and his remarkable recording system and associated collection (for in some ways that is the way round it was) is worth describing. Not only will this help others who may wish to use this important resource, which he bequeathed to the National Museums of Scotland, but also it will illuminate his quite exceptional standards of curation and organization.

On virtually every occasion that Teddy saw an identifiable lepidopteron it was noted — first into a rough notebook, that included records of all insect orders, but then by subsequent transcription into his more formal notebook series entitled 'Lepidoptera records'. The latter are effectively diaries as they are arranged chronologically, and at the time of his death the series comprised 64 foolscap octavo volumes, totalling 17 377 pages numbered as a single sequence, starting on 11 November 1935 and ending on 13 December 1988. However, the early volumes are not originals in the strict sense. Teddy's system and collecting focus were not fully evolved until the late 1940s, when he decided to transcribe all the records to a new series to standardize format. This process was completed by 1954, and from then on the notebooks were compiled essentially as dated.

For each date/locality combination, all species seen are listed on the right hand pages using the nomenclature and systematic sequence of specified checklists and published addenda (Heslop, 1947 until 1973 and then Kloet & Hincks, 1972). Details of frequency are given against each species (sometimes abbreviated F(a few) = 2–5, S(several) = 6–15, M(many) = 16–50, V(very many) = over 50, though complete counts of moth trap catches are regularly given), and early stages are included with emergences later recorded on the date they happened. Any specimen retained for the collection is given a consecutively (and chronologically) running serial number on the left hand page opposite, this number also appearing on the specimen's data label and on any associated slide mounts. A supplementary numbered sequence (prefixed M and chronological only as to date of preparation), also on the left hand pages, is used for slide mounts. These slide numbers are also carried on the relevant specimens, and listed sequentially in a register that records full data and identities as well as details of the chemical preparation of each slide. All updating of information in the notebooks, including species later identified by others collecting with him, notes on reared parasitoids, supplementary descriptions, and cross-referencing of page numbers (for example between dates of collection and emergence), is done on the left hand pages.

One of the most important features of the records is that they are comprehensively indexed. There are two huge loose-leaf indices to the notebooks, one to species (in which page numbers, grouped under year, are recorded for each species on separate sheets that are arranged in systematic sequence), and the other to localities. The latter is arranged through a parish and vice-county system. There are master sheets for each vice-county, on which are listed all parishes from which records were obtained. The locality index itself is then grouped according to VC number

sequentially and, within each vice-county, separate sheets for each parish are arranged alphabetically: on these, relevant page numbers are entered, grouped as before into years. By referring back to the notebooks not only the species seen but also six-figure map references, or details of routes taken, can be extracted.

The whole notebook system is written in pencil (only the serial numbers for retained specimen are in ink), which has presumably contributed much to the extraordinary neatness with which Teddy maintained such a complex array of data. There are also several secondary compilations of organized data abstracted from the primary records system — for example, for localities or families in which he had a

particular interest — and he maintained extensive lists and indices relating to literature on Lepidoptera and to the specimens he had examined in the collections of others.

The same standards of presentation, curatorial neatness and cross-referencing are seen in his collection, which amounts to around 35 600 mounted specimens. All have labels printed in 4-point type (with dates, serial numbers and relevant biological data hand-written in ink) that he prepared on his own Adana press: the alphabetically arranged register of 'labels printed' that he also maintained runs to seven loose-leaf volumes! Supplementary labels refer to the slide collection where appropriate. The herbarium of larval workings is arranged alphabetically according to plant genus and is housed in about 450 transparent plastic wallets in eight loose-leaf volumes, labelled and cross-referenced to the notebooks. The slide collection contains 2682 genitalia preparations of a very high standard, again fully labelled and cross-referenced.

Being based in Scotland for much of his life Teddy did a lot of fieldwork there, but his collecting trips were very widespread. It was a source of pride to him that he had records from every vice-county in the UK and nearly every one in Ireland: indeed when on long car journeys he would often make considerable detours — even at unpromising times of year — in the hope of adding a few personal records from vice-counties only poorly represented in his system, and whenever possible he would travel with his full set of 1″ 7th series Ordnance Survey maps, which he much preferred to the 1:50000 series. He always ensured that he had the best possible equipment for all his entomological activities, and spared no effort or cost over this. As well as spending many hours searching suppliers' catalogues for the ideal stationery or perfect device (which he would then buy in bulk), he would often have things specially made or modified. At one time, for example, he had a Morris Minor Traveller with a built-in setting table. His library, too, was formidable and contained some great rarities in its comprehensive coverage of British and European entomology with specia! reference to the Lepidoptera. He had a particularly good collection of local lists, and the library was also strong in botany and horticulture. His overall aim was always to be in a position to identify any insect or plant he was at all likely — or even rather unlikely — to find.

Teddy was a successful collector, partly because of his continual readiness to expect the unexpected combined with his knowledge of the European fauna. Among the species of Lepidoptera which he added to the British list (in some cases in conjunction with others) are: *Trifurcula subnitidella* (Dup.) = *griseella* Wolff, *Nemapogon inconditella* (Lucas) = *heydeni* Petersen, *Bucculatrix capreella* Krogerus = *merei* Pelham-Clinton, *Parornix alpicola* Wocke, *P. leucostola* Pelham-Clinton, *Callisto coffeella* (Zett.), *Phyllocnistis xenia* Her., *Coleophora sternipennella* (Zett.), *Elachista orstadii* Palm, *E. eskoi* Kyrki & Karvonen, *Agonopterix kuznetzovi* Lvovsky, *Scrobipalpula tussilaginis* (Frey), *Acleris abietana* (Hübn.), *Pammene ignorata* Kuznetsov, *Nomophila nearctica* Munroe, *Choloroclystis chloerata* (Mab.), and *Herminia tarsicrinalis* Knoch. But he was not just a lepidopterist: he added also Trichoptera (*Nemataulius punctatolineatus* (Retz.) and *Ylodes reuteri* (McLach.), Coleoptera (*Mycetoporus hellieseni* Strand, though this is now regarded as conspecific with *M. bauderi* Muls. & Rey), and Diptera *Culicoides cameroni* Campbell & Pelham-Clinton, *C. manchuriensis* Tokunaga = *machardyi* Campbell & Pelham-Clinton, *C. poperinghensis* Goetghebuer, *C. reconditus* Campbell & Pelham-Clinton, *C. segnis* Campbell & Pelham-Clinton and *C. subfasciipennis* Kieffer). One species each of Lepidoptera (*Scrobipalpa clintoni* Povolný), Coleoptera (*Atheta clintoni* Kevan) and Diptera (*Culicoides clintoni* Boorman) named in his honour also bear testimony to his breadth of knowledge and influence.

The perfections that Teddy set himself — together with his delight in doing everything for himself, his enjoyment of complicated and logically complete systems, and his being completely undaunted by the immensity of some of the tasks he embarked upon — were strengths, indeed, but carried with them some inevitable penalties. Impressive though his publications are, many of us wish that he had committed more of his knowledge to paper. But Teddy would only publish when the work was up to his own expectations, and even in retirement he found it difficult to make time for a high output. It is particularly unfortunate that so much of his knowledge of the Elachistidae, which was to have been expressed as his next major contribution to *The moths and butterflies of Great Britain and Ireland*, has died with him. He will be greatly missed as an associate editor of this series, although his diaries will no doubt continue to be an important source of records for all families.

As a person Teddy was reserved and at first he could seem diffident and shy. He did not find it easy to comprehend those of different backgrounds and outlook. Despite this his company was highly valued by many friends, and his infectious enthusiasm and sense of humour made him an excellent companion: one from whom one did not fail to learn, and in a most enjoyable manner. He worked very closely with Robin Mere, doing much in the Isles of Scilly and the Burren of Co. Clare until Robin's untimely death. After that his closest collecting companion was Denzil Ffennell until he also died at an early age. So Teddy experienced considerable sadness but did not reveal his feelings very often. In the latter years his companion for most trips was John Langmaid.

Besides his entomology there were other interests and in every case he was amazingly knowledgeable. He loved music and gardening, having a special interest in rhododendrons. He was a very fine cook and knew his wines better than most people, so that collecting journeys with those who were able to afford it were often gastronomic adventures!

Teddy will be well remembered by many members of this Society as a reliable and ever helpful mentor, as well as a man of kindness and old-fashioned courtesy. Many who knew him best will also cherish memories of enormous fun, complete with helpless laughter that to outsiders might well have seemed inane. The Society itself receives a bequest of £100 000 under his Will made in 1980: this was intended to have provided permanent accommodation in London, but in recent years the value of property has increased so much that this hope cannot now be realized. Nevertheless the bequest comes at an hour of need and will probably play a crucial role in the Society's current search for a new headquarters.

There was some surprise among all but his closest friends when Teddy succeeded to the title of 10th Duke of Newcastle, only five weeks before his death but in time for some leg-pulling at the 1988 Annual Exhibition and Dinner. In the absence of a male heir the title has now died too. Teddy never married but he is survived by his mother, to whom our sympathies are extended.

M.R. Shaw & D.J.L. Agassiz

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SHORT COMMUNICATION

***Oxypoda praecox* Erichson (Coleoptera: Staphylinidae) an addition to the British fauna.**—As part of a Nature Conservancy Council survey of the invertebrate fauna of selected coastal shingle sites a number of trap lines were set up at Dungeness, Kent. A pitfall trap placed on an alluvial bar with *Phragmites*, *Urtica dioica* and *Circium arvense* between 25.v.89 and 9.vi.89 captured a single female *Oxypoda praecox*. This is one of the smaller *Oxypoda* and most closely resembles *O. lurida*, it has similar long maxillary palpi (rather like *Myllaena*). It is however paler than *lurida*, of broader form, with the abdomen more tapering. It is smaller, 1.7–2.1 mm (*lurida* is 2.3–2.6 mm). Lohse (1974) gives an excellent key, figure of the foreparts showing the long palps and illustrates the genitalia. He states that *praecox* is uncommon. Horion (1976) gives a detailed account of its distribution showing that it comes westwards as far as Belgium and Holland. I thank Dr Ian McLean and Mr Roger Morris of the NCC for the opportunity to examine the Dungeness material.—S.A. Williams 40, Preston Park, Faversham, Kent ME13 8LN.

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BENHS INDOOR MEETINGS

14 September 1989. Joint meeting with the London Natural History Society

The President Mrs F.M. MURPHY announced the death of Mr S.N.A. Jacobs. He had been a member since 1923 and had at various times held most of the offices of the Society, including twice being President.

MEMBERSHIP

The names of Roy Crossley, Andrew Gordon Duff and Martin Clive Askins were read for the second time and these persons were duly elected as members.

COMMUNICATIONS

Mr K. HYATT made available some copies of the BM(NH) 1960 Bulletin on British Slugs by H.E. Quick.

Mr A.J. HALSTEAD displayed a letter received from Rothamsted Experimental Station giving advance notice of three posts soon to be advertised concerning the migration of moths within the farm ecosystem.

LECTURE

Mrs L. PITKIN gave a talk on the underwater life around Cayman Brac, which is part of the Cayman Islands in the Caribbean south of Cuba. The lecture was illustrated with slides of various types of coral, sponges, sea anemones, brittle stars, octopus, shrimps, crabs, tube worms and fish. Mrs Pitkin gave details of the equipment and techniques she uses for underwater photography.

VOTE OF THANKS

On behalf of the London Natural History Society, Mr C.B. Ashby gave a vote of thanks to the speaker and the BENHS for hosting the sixth annual joint meeting between the two societies. He made available some copies of No. 15 *The London Atalanta* which contains a transcript of a lecture given by Prof. P. Grime on 'An ecological classification of organisms'. He also distributed some copies of the current LNHS programme of meetings which members of the BENHS are welcome to attend as guests. Mr Ashby displayed some examples of LNHS recording cards and in particular asked for records of damselflies and dragonflies in the Society's recording area, which is 20 miles radius from central London.

28 September 1989

The President, Mrs F.M. MURPHY announced the death of Mr T.S.H. Wordsworth.

EXHIBITS

Col. A.M. EMMET showed eight specimens of *Phyllonorycter leucographella* (Zell.) (Lepidoptera: Gracillariidae) a species first recorded in Britain in 1989. These came from Wickford, Essex, and were bred from mines in the leaves of the garden shrub *Pyracantha coccinea* L. The specimens exhibited represented four from the first generation in April and four which emerged from the second generation in July. This species and its discovery are fully described in *Entomologist's Rec. J. Var.* 1989;

101: 189–194. Since that article was written the existence of a second generation, not recorded in the continental literature, has been confirmed. Moths of the July generation are fewer in number and smaller in size.

Prof. J.A. Owen showed an example of the violet click beetle, *Limoniscus violaceus* (Müller), one of the two beetles now scheduled for protection under the Wild Life and Countryside Act. The specimen was reared from a larva found in wood mould in a fallen beech at Windsor in 1983. He also showed a photograph of the larva. Apart from a single specimen taken near Tewkesbury in 1939, the beetle has been recorded in Britain only from Windsor Forest where its long-term future is somewhat uncertain owing to its special requirements. Indeed, a case could probably be made for establishing a culture of the insect as a means of ensuring the continuation of the British strain. The beetle is easily reared from larvae. Getting adults to mate and lay eggs might be a problem but this has been achieved with other wood-inhabiting elaterid beetles. Professor Owen noted that a recent edition of the *Sunday Telegraph* colour magazine had featured 100 endangered British plants and animals. These included the violet click beetle but the photograph used in the magazine was of another species, *Ctenicera cuprea* (F.) This beetle is much more violet in appearance than the rare species.

Mr P. Sokoloff commented that there were a number of other inaccuracies in the *Sunday Telegraph* magazine article.

Membership

The names of Robert James Bruce Hoare, Alan John David Morris and Brian Lynn Statham were read for the second time and these persons were duly elected as members.

Announcements

The Secretary, Dr J. Muggleton, said that the £100,000 legacy from the estate of the Duke of Newcastle, E. Pelham-Clinton, had been received. This would be used to help secure new premises for the Society.

Communications

Col. Emmett brought to the meeting a copy of the book *New Zealand butterflies* by George W. Gibbs, published by Collins in 1980. This has been donated to the Society's library by Joan Heath in memory of her late husband John.

Lecture

Caroline Steel spoke on the future of British butterflies. In the last hundred years four species have been lost while others have shown varying degrees of local decline. This has been due to various factors, including changing land use, drainage schemes, loss of broad-leaved woods, coniferization, traditional land management methods becoming uneconomic and the fragmentation of remaining suitable habitats. In recent years there has been increasing concern over butterfly conservation and 17 British species have been researched to discover their ecological requirements. This can help landowners to adapt their management programmes in ways which will assist butterflies. There are, however, few professional butterfly conservationists at the present time and funding for their work is difficult to obtain. The work of the British Butterfly Conservation Society was described.

The speaker looked into the future for developments that might help butterflies. More money is required for research and for training volunteers in site management.

It may be possible to obtain this funding from sponsorship arrangements. Stronger legislation is required to protect important butterfly sites, rather than the present limitations on collecting and trading. The EEC Habitats Directive will help in this respect if it is ratified. The reintroduction of some species into suitable areas from which they have become absent may be more widely undertaken. The creation of butterfly habitats may be possible with farm land going out of production and this may help reverse the process of habitat fragmentation. The 'greenhouse effect' could have profound effects on Britain's butterfly fauna, with some species benefitting while others may retreat northwards or even die out if they or their host plants cannot cope with the climatic changes.

12 October 1989

Exhibits

Mr A.J. Halstead showed a live specimen of *Stethorus punctillum* Weise (Coleoptera: Coccinellidae) and a piece of leaf bearing three empty pupal cases. This species feeds on red spider mites and is Britain's smallest ladybird. It was found on a glasshouse-grown peach at RHS Garden, Wisley, Surrey.

Mr M.J. Simmons showed a specimen of the butterfly *Aphantopus hyperanthus* L. ab. *lanceolata* Shipp. together with the typical form. The aberration *lanceolata* is recognized by the increased size and pear shape of the spots on both the fore and hind wings, although the pear-shape nature of the spots was only clearly defined on the hind wings of this specimen. The butterfly, which was taken in the Bialowieza Forest in Eastern Poland on 27.vi.89, had fallen victim to a crab spider (*Misumena* sp.).

Mr D.A. Moore showed a male and female of Roesel's bush cricket *Metrioptera roeselii* (Hagenbach) taken at Park Street, Herts. This species has become more widespread in recent years and is now common in some parts of south Hertfordshire.

Membership

The names of Paul Leonard Theodor Beuk and David Hipperson were read for the second time and these persons were duly elected as members.

Lecture

Dr M.E.N. Majerus spoke on the Cambridge Ladybird Survey 1984–89. This enterprise began with a display of British ladybirds staged at the 1984 AES exhibition. It was hoped that some of the visitors would take part in a survey which would provide information about the distribution, behaviour and ecological requirements of Britain's ladybirds. The scale of the survey rapidly increased when it was given national publicity by the press, radio and television. In particular the scheme was taken up by the children's conservation organization 'Watch'. To enable children to identify ladybirds with confidence the scheme was limited to the 24 species which have distinctive markings and typical ladybird shape. Colour identification charts have been produced together with regular newsletters for contributors to the scheme. Dr Majerus showed distribution maps based on the records submitted to him since the survey began. In the future Dr Majerus hopes that contributors to the scheme may provide records of parasites of ladybirds, and of certain insects which are possible ladybird mimics to see whether their distributions match those of their supposed models.

26 October 1989

Exhibits

Mr A.J. Halstead showed a live specimen of the 2-spot ladybird, *Adalia bipunctata* (L.), taken at RHS Garden, Wisley, Surrey. This common species has very variable markings and the specimen shown was close to the form *duodecimpustulata*.

Communications

The President, Mrs F.M. Murphy, asked Dr I. McLean to comment on the proposed reorganization of the Nature Conservancy Council. Dr McLean said that the former Minister for the Environment, Nicholas Ridley, had decided to split the NCC into three parts to cover England, Scotland and Wales. In Scotland and Wales the NCC would be merged with the Countryside Commission but these organizations would remain separate in England. Dr McLean said that this break up of the NCC could weaken its influence when dealing with international matters and national policies. It would also adversely affect some of the scientific work currently carried out on a national basis. He said that if members felt that the reorganization was not helpful they should write to their MPs.

Dr B. McNulty said that despite the hot summer he had seen very few of the usual migrant butterflies and moths at his home in South Wales. There was general agreement with this situation. Dr McLean said that the holly blue butterfly had made a strong recovery this summer. Mr M. Simmons noted that some holly blues he had bred this year had shown a much lower rate of parasitism than is usual with this species.

Lecture

Dr A.J. Mitchell-Jones spoke on the subject of 'Insects — food for bats?'. He showed slides of various species of bats and played tape recordings of the echo location sounds made by bats as they hunt for food. Some species of bat can distinguish between sounds reflected back from fixed objects, such as leaves, and those produced by moving insects. This enables them to hunt near trees and shrubs. Other bats are largely confined to hunting in more open areas where there is less interference from background noise sources. Some moths can hear the high frequency sounds made by bats and will drop to the ground when a bat approaches. The garden tiger moth makes its own ultrasonic sounds, possibly as a means of deterring night-time predators which cannot see the moth's warning coloration. Dr Mitchell-Jones described how an indication of what bats have been feeding on can be discovered by identifying insect fragments in bats' droppings. A bat will often repeatedly use the same roosting place for feeding when insects have been caught. Moth wings and other debris accumulates underneath the feeding roost and this also provides information on the bat's diet.

9 November 1989

Membership

The names of Phillip John Butterworth, Clifford Lee Bunfield, Jean Cooke, Rodney Christopher Dennis, David Christopher Gardner, Jeffrey A. Harvey, Ian John Popple, Andrew David Powell and Leonard Winokur were read for the second time and these persons were duly elected as members.

Announcements

Mr M. Simmons said that next year's indoor meetings would be held at the Royal Entomological Society's premises at 41 Queen's Gate. These meetings have had to be rearranged for Wednesday evenings, with the exception of the AGM which will be on Tuesday, 27th February. The dates of the ordinary meetings will be 10th and 24th January, 14th February, 14th and 28th March, 25th April and 9th May. The speakers are able to do the rearranged dates, although the 14th February lecture has still to be confirmed. Members were asked not to arrive at the Royal Entomological Society's rooms before 6.00 p.m.

Communications

Mr A.J. Halstead said that on 2nd November he had seen a female toad in a partly drained pond at RHS Garden, Wisley, Surrey. A male was firmly clasped to her back in the mating position and perched on the male's head was a young toad about 20 mm long. The participants in this unseasonable union were transferred to a more permanent pool.

Mr R.A. Jones noted that although the two-spot ladybird, *Adalia bipunctata* (L.), was a variable species he usually found little variety compared with the 10-spot ladybird. He had, however, found some different forms recently under bark at Nunhead Cemetery in London. Dr J. Muggleton said that melanic forms of the 2-spot ladybird are more likely to occur in northern districts.

Report on the Annual Exhibition

Mr Halstead said that attendance had been very similar to last year with 191 members and 84 visitors signing the attendance book. There was a total of 152 exhibits which were made up of British butterflies 20, British Macros 42, British Micros 24, foreign Lepidoptera 17, Diptera 10, Coleoptera 15, Hemiptera 3, Hymenoptera 10, illustrations 8 and others 3. Reviews of some of these categories were given by Mr Halstead (Hymenoptera), Mr R. Tubbs (British butterflies), Mr R. Jones (Coleoptera and Hemiptera) and Mr J.M. Chalmers-Hunt (British Micros).

Mr R. Hawkins noted that some exhibits showed that some sites were still producing good insects comparable with records made in Victorian times. Such sites had presumably changed little over the years although there had been a reduction in grazing by rabbits following myxomatosis which had affected downland sites.

Slide evening

The President, Mrs F.M. Murphy, showed slides taken during May 1989 in Corsica. She showed some of the interesting wild flowers, spiders and other animals to be found there. Some photographs of members taken at recent field meetings at Box Hill were also shown.

Mr A. Spalding showed a series of slides on the sandhill rustic moth, *Luperina nickerlii leechi* Goater. This particular form is confined to a small area of The Lizard in Cornwall. Mr Spalding gave details of the habits of the larvae and adults, which have become less numerous in recent years. He described the habitat and factors which may have contributed to the moth's decline.

Mr M. Simmons showed a selection of slides, mostly of butterflies, taken on a visit to Poland near the Russian border in late June and early July.

23 November 1989

The President, Mrs F.M. MURPHY, announced the death of Mr E. Trundell of Llanrwst, Gwynedd.

EXHIBITS

Mr E. BRADFORD showed a specimen of *Opilo mollis* L. (Coleoptera : Cleridae) taken at an actinic light at Pean Hill, Kent, on 1.vii.89.

Mr R. SOFTLY showed an unidentified weevil taken at actinic light on Hampstead Heath in early November.

MEMBERSHIP

The names of Philip Brian Butler, Jean Jacques Lamarre, Edward Lees, Benjamin John Frederick Pateman and Kenneth Frederick Williams were read for the second time and these persons were duly elected as members.

ANNOUNCEMENTS

The Secretary, Dr J. MUGGLETON, said that next year the Society would be meeting at the rooms of the Royal Entomological Society and he would endeavour to bring copies of our Society's publications for those members who wished to purchase them.

COMMUNICATIONS

Dr I. MCLEAN drew members' attention to a proposal to construct a golf course on the Langness peninsula on the Isle of Man, which is the only known site for the Manx grasshopper, *Stenobothrus stigmaticus* Ramb., in the British Isles.

Mr M. SIMMONS informed the meeting about an article in that day's edition of *The Times* about the rediscovery of the tenebrionid beetle *Omophlus rufitarsis* (Leske) at Chesil Beach, Dorset, by Howard Mendel, Roger Key and others. Apart from a pupa at Weymouth in the 1960s, this beetle, which is believed to feed on the pollen of sea thrift flowers, was last recorded in 1926. Mr Simmons asked whether this rare beetle ought to be placed on the protected list. Dr McLean replied that many rare insects had not been placed on Schedule 5 and that it was probably best to keep this as a select list, leaving most rare species covered by their appropriate Red Data Book classification.

Mr Softly asked if there was any danger to the beetle's habitat. Dr McLean said that the area was an SSSI and it should be safe from hazards such as gravel extraction.

Mr Simmons also noted another article in *The Times* in which Jennifer Clark of Cambridge University suggested that there is evidence that the first amphibians may have breathed through their ears. This theory is based on a study of 350-million-year-old fossils of a species called *Acanthostega*.

LECTURE

Mr A. BRACKENBURY spoke on 'The natural history of a signal box'. He had been a railway signalman since 1947 but did not take up an active interest in natural history until he was transferred to the signal box at Oughtibridge near Sheffield in 1966. The box was near a river crossing of the River Don to the north west of the city where the railway runs past Wharncliffe Wood. Although he had no formal training in entomology, he was encouraged by members of the Sorby Natural History Society to collect and observe insects near the signal box. He set about improving the habitat around the box by removing rubbish, making a small pool and creating log piles from

felled sycamore and birch saplings. Because he could not move far from the signal box he encouraged hoverflies and other insects to come to him by placing cut wild flowers in water filled tubes within easy reach of the box. This method of recording insects has now become widely known amongst dipterists as the use of 'Brackenbury lures'. During the time he was stationed at Oughtibridge, Mr Brackenbury recorded about 105 species of hoverflies, including a number of national rarities and first records for the Sheffield area. The talk was illustrated with slides that showed the signal box and its environs throughout the four seasons. Apart from its official purpose, the box became converted into a laboratory, a photographic studio and an observation hide as Mr Brackenbury's enthusiasm for natural history grew. He was able to obtain remarkable series of photographs of a weasel feeding on fat put out for birds, of mice and voles feeding and interacting with each other, and shrews and squirrels, and of the weevil *Attelabus nitens* (Scop.) as it folded up a sweet chestnut leaf prior to laying an egg.

In 1983 the signal box was replaced by an automatic system of signalling and the speaker took redundancy. Sadly, the box where so many detailed studies were made has been made unusable and is now in a state of dereliction. However, the experience gained during the years at Oughtibridge have enabled Mr Brackenbury to start a new career as a consultant entomologist doing survey work.

14 December 1989

The President, Mrs F.M. Murphy, in the chair for the Society's final meeting at 74 South Audley Street.

Exhibits

Prof. J.A. Owen showed a specimen of the carabid beetle *Cymindis macularis* Fischer de Waldheim taken near Thetford, Norfolk, on a visit with Howard Mendel on 24.vi.89. This scarce species was first recorded in Britain by Peter Hammond who, in 1981, identified a single head of the beetle while examining some pellets deposited by stone curlews in the Breck area of West Suffolk. Subsequently it was discovered that a few other specimens had been collected previously at a Breckland site but had been misidentified. *C. macularis* resembles *C. axillaris* (F.), which was also shown by the exhibitor for comparison. They can be distinguished as the elytra are pubescent in *macularis* but glabrous in *axillaris*. Both species were present at the site near Thetford.

Announcements

The Secretary, Dr J. Muggleton, reminded members that the next indoor meeting would be on Wednesday, 10th January, in the council room of the Royal Entomological Society. The Society's collections and library had been removed into store with Pickfords. Mr C.B. Ashby had arranged for the London Natural History Society's library to be made available to BENHS members until such time as the BENHS library is accessible again. The LNHS library contains about 6000 volumes and periodicals and is kept at Imperial College in a building adjacent to the Sherfield Hall. It is only a short walk from the RES rooms and during term time the library would be open until 9.00 p.m. Anyone wishing to use this facility will need a library ticket, which can be obtained through Dr Muggleton. A letter would be distributed to all members shortly after Christmas to inform them of the Society's new arrangements.

Lecture

Dr D. Corke spoke on the possible role of pheasants in the decline of fritillaries and other butterflies in Britain. He had already published an article on this subject in the April 1989 edition of the *British Journal of Entomology and Natural History*. His intention was to allow members to digest the data in the paper so that an informed discussion could take place. Unfortunately, some newspapers had picked up the article and taken parts out of context. They had given the impression that the article proved that pheasants were responsible for declining butterfly numbers, which is a theory strongly disputed by the shooting and game-keeping fraternity. Dr Corke stressed that although there was a correlation between increasing pheasant rearing and declining butterfly numbers, there was only circumstantial evidence that they were linked and more experimental work was required.

Dr Corke said that butterfly declines were particularly marked in the east of England. He noted that Essex had lost 19–20 of the 48 species once recorded there. He compared this with a Pyrenean valley he is familiar with where butterflies abound and he has recorded 70 species. He outlined a number of factors which combine to affect butterfly numbers. These were (1) habitat destruction and change of land use; (2) the use of insecticides and other chemicals; (3) climate; (4) air pollution, which can affect host plants as well as insects; (5) habitat fragmentation; (6) nectar requirements of the adult stage; (7) predation and parasitism, in which birds play a part.

Dr Corke noted that moths in general had not suffered the declines shown by butterflies but that day-flying moths were less abundant. This suggests that predators such as birds could be taking the adults, although the effort required to take flying butterflies or moths may make them a less rewarding food item. Butterflies lay large numbers of eggs, many of which will fail to develop through to the adult stage. Mortality is normally in the range of 90 to 99.9%. Pheasants are general feeders and do not specialize on insect prey. Dr Corke said that where pheasants were reared for shooting they received much of their food from the landowner. This releases them from the need to hunt for food and may give them time to experiment with other food items. Caterpillars or pupae are likely to be fatally damaged if handled by a bird's beak, even if they are subsequently rejected.

The lecture was followed by a lively discussion in which members questioned some of the speaker's observations and assumptions.

10 January 1990

Exhibits

The President, Mrs F.M. Murphy, showed a live female house spider, *Tegenaria domestica* (Clerck). It is a very common spider which occurs in buildings throughout Europe and has been found out of doors in Madeira by the exhibitor. The specimen exhibited has some sentimental value as it was captured from under the large bookcase when the Society's library was being moved out of our former rooms at the Alpine Club. Mrs Murphy also circulated a Christmas card showing a cartoon entitled 'The entomology class', drawn by Barry Flahey of Ontario, Canada.

Membership

The names of Gavin Boyd, Roger Shaw, Dennis Day, David Akers, Phillip James

Beere and James Ernest Pateman were read for the second time and these persons were duly elected as members.

Announcements

The Secretary, Dr J. Muggleton, said that a London bookseller had reported to the Society that he had been offered nine books with uncancelled BENHS library stamps. These books, which were Lepidoptera and botany titles, may have been stolen during or after the library's move into store. The books remain missing as the thief ran off with them when the bookseller queried the library stamps. The Librarian, Mr S. Miles, said that antiquarian booksellers had been circulated with details of the books. He said that any books with uncancelled BENHS library stamps being offered for sale were stolen property. Members finding such books in second-hand bookshops should make this known to the proprietor and ask for the police to be called in order to establish ownership of the books. It was not known whether other books had been taken and this could only be ascertained by bringing the library out of store and undertaking the massive task of stock taking.

Communications

Mr M. Simmons reported the first moth of the year, a mottled umber moth, *Erannis defoliaria* (Clerck) seen on New Year's Day.

Lecture

Mr M. Oates spoke on 'Butterfly introductions, past, present and future'. The first recorded attempts to introduce butterflies or otherwise enhance wild populations seems to have been attempts to maintain the black-veined white during the 1840s. The speaker, with co-author Martin Warren, has recently carried out a review of butterfly introductions in Britain for the NCC. They believe that the number of attempted introductions must be at least a four figure number. Re-introductions are often attempted by hobbyist entomologists, sometimes clandestinely, and there is frequently little detailed study of the subsequent progress of the butterfly colony. The majority of introductions survive for no more than a few seasons. The lack of records of how introductions have been made and their subsequent fate represents a missed opportunity to learn from past mistakes.

The speaker said that re-introductions can help to reverse the decline of butterflies but must be done with care if the practice is not to get a bad image. He drew attention to the codes of conduct produced by the Joint Committee for the Conservation of British Insects and, more recently by the British Butterfly Conservation Society. Copies of these were circulated. He said that releasing species whose ecology is poorly known is likely to be a waste of time. Similarly there is little point in trying to establish highly mobile species that are capable of introducing themselves if conditions are suitable. Butterflies should be released into sites where detailed study suggests that there is a good chance of success and where there is likely to be continuing management of the site to keep it in a favourable condition. This is particularly important for those species whose habitat is of a transitional nature. The speaker closed his talk by speculating on the effects of global warming on Britain's butterflies. He warned that much of the information available on site management for butterflies could soon become invalid due to changes in plant growth brought about by a warmer, drier climate.

The lecture was followed by a discussion on butterfly introductions.

Before the meeting dispersed the Secretary announced that, after extensive

market research, he could recommend the Norfolk Tavern, near South Kensington tube station, as a replacement for the Red Lion.

24 January 1990

Exhibits

Mr R. Softly showed some winter-feeding moth larvae collected on Hampstead Heath. These were the noctuid species *Noctua pronuba* L., *N. fimbriata* Schreb., *Xestia xanthographa* D. & S. and an *Apamea* sp. Also shown were a noctuid larva mummified by the braconid parasite *Rogas* sp., and the remains of a noctuid larva with a tachinid fly puparium.

Mr R. McCormick showed a series of colour photographs which illustrated a trip by the exhibitor, Bernard Skinner, David Wilson and Colin Penney on 23.ix.89 to a site in Lincolnshire where the marsh moth, *Athetis pallustris* Hübn. has been found in numbers. The purpose of the visit was to see if the larvae were also common. The photographs showed larvae found in piles of cut grass, and the wire griddle used to sieve out the larvae. In the area searched *A. pallustris* proved to be the predominant larvae with some *Tholera cespitis* D. & S. and others also present. The larvae collected by the exhibitor are being kept in his garden on a large pot of *Plantago lanceolata* L. and other herbage. The pot is protected by a sleeve and a piece of corrugated plastic.

Prof. J.A. Owen showed three live examples of *Chrysolina crassicornis* (Helliesin) (Coleoptera: Chrysomelidae) which had 'over-wintered' in a domestic refrigerator, and colour photographs of the eggs, a second instar larva and a pupa. The adults had been reared the previous summer from eggs laid by a wild female from Argyll, Scotland, at a site discovered by Mr R. Lyszkowski. It has previously been recorded from various sites on the west coast of Scotland, as well as from Orkney and Shetland, but is now sufficiently local to be given Red Data Book grade 1 status. On location the beetles were living on *Plantago maritima* L. but in captivity the larvae and adults feed readily on *Plantago lanceolata* L. The over-wintered adults had paired and laid eggs from which a second captive generation of larvae was being reared.

Announcements

The President, Mrs F. M. Murphy, said that Colin Plant had notified the museum biology curators' group of the books stolen from the Society's library. The missing books are: *British butterflies and their transformations* by J. O. Westwood; *The genera and species of British moths* and *The genera and species of British butterflies* by H. Noel Humphreys, and *The flowering plants, grasses and ferns of Great Britain*, 1873—all six volumes, by Anne Pratt.

Communications

B. K. West said that he had recently returned from a collecting trip to Venezuela. On the plane he got into conversation with another passenger who had been collecting without a permit in Brazil. When this person tried to leave Brazil all his specimens and equipment were seized and burnt. He urged members to make sure that they had the necessary permits, as some other South American countries, such as Ecuador and Colombia, also have strict rules. The President noted that when she took some live spiders out of Panama she was required to have a health certificate for them.

Lecture

Mr P. Waring spoke on the problems of conserving Britain's rarest moths, with particular reference to those listed in schedule 5 of the Wildlife and Countryside Act. Habitats need to be maintained in a suitable condition but there is often little reliable information available in Britain concerning what are the best conditions for the rarer species. In his studies with fenland moths, the speaker has run a number of actinic lights simultaneously to see whereabouts on a site the scarce species were taken in the greatest numbers. This type of survey can demonstrate variations in the moth distribution caused by different lengths of reed cutting cycle. Searching for the eggs, larvae or pupae can also indicate favourable types of habitat as the immature stages show where the species is actually living, whereas light trapping records where the adults are flying. Some of the rarest moths now occur in low numbers at just one or two sites. For those species it may be too late to see them living under ideal conditions as their last remaining sites may have deteriorated. Careful research is required to study the biology and habits of rare species and to monitor the effects of habitat management on their numbers.

Mr Waring has been successful in breeding in captivity two of the schedule 5 moths, the black-veined moth *Siona lineata* Scop. and the Essex emerald *Thetidia smaragdaria* F. The latter had declined to a very low level and in 1987 it appeared to be confined to one site where only 11 larvae could be found. These were kept in captivity and a second generation of 200 larvae has been obtained. Until Mr Waring began studying the black-veined moth, it was widely accepted that the larval food plant was the grass, *Brachypodium pinnatum* (L.). Feeding tests with captive larvae suggest that the food plant is more likely to be marjoram *Origanum vulgare* L., a fact that has profound implications for effective habitat management. The barberry carpet *Pareulype berberata* D. & S. was once widespread but has declined, possibly due to farmers removing wild barberry *Berberis vulgaris* F. & S. from hedgerows as it is a host of wheat rust. Its main site is in Suffolk but recently another site has been found in Gloucestershire where the larvae are feeding on a *Berberis* sp., which is yet to be identified but is not *B. vulgaris*. Searches for the viper's bugloss moth *Haderia irregularis* Hufn. in the Breckland in recent years have failed to find adults or larvae and this species may have been lost. The reddish buff moth *Acosmetia caliginosa* Hübn. also appears to have gone from England but still occurs on the Isle of Wight. Action is required to prevent its food plant, saw-wort *Serratula tinctoria* L., being shaded out by shrub growth.

The future of Mr Waring's studies are in some doubt as his contract withthe Nature Conservancy Council is coming to an end. Plans to extend the contract are threatened by a reduction of funding brought about by the proposed splitting up of the NCC.

14 February 1990

The President, Mrs F. M. Murphy announced the death of Mr Beaumont Weddell, who had been a member since 1945.

Exhibits

Mr R. A. Jones showed the local ladybird *Halyzia sedecimguttata* (L.) found hibernating under beech bark in woods below Chanctonbury Ring, West Sussex, 4.ii.90. In this beetle the head is completely covered by the pronotum which is broadly transparent along its front margin.

Mr P. HODGE noted that the orange ladybird, *H. sedecimguttata*, appears to have become more common in Sussex and East Kent in recent years. Dr Muggleton agreed and said this may be due to Dr Majerus' discovery that this species is associated with sycamore trees. It is not known to be a migratory species.

MEMBERSHIP

The names of David Alexander Neal, Phillip Porter and Peter Ronald Smytheman were read for the second time and these persons were duly elected as members.

ANNOUNCEMENTS

The Secretary, Dr J. MUGGLETON, said that library cards for the use of the London Natural History Society's library at Imperial College had been received and were being distributed to those who had applied for them. Anyone else requiring a card should apply to the Secretary.

COMMUNICATIONS

Mr Jones read a letter received from Mr P.C.N. Dean of Warlingham, Kent, in which he reported seeing a peacock butterfly *Inachis io* L. flying strongly at Bewl Water Reservoir, Kent, on 18.i.90.

Mr R. SOFTLY said that the tachinid puparium associated with a noctuid larva that he had exhibited at the last meeting had produced an adult fly during the previous week. The puparium had been kept on a windowsill between double glazing with the outer window open.

LECTURE

Mr P. HAMMOND spoke on 'The diversity of Coleoptera'. Diversity, in terms of species richness for a habitat or geographical region, can be difficult to assess as the total number of species present is often unknown, particularly in situations such as tropical rain forests. Theoretical calculations have been made but these rely on a number of assumptions which may introduce a wide margin of error. Mr Hammond took part in the 'Project Wallace' expedition on the Indonesian island of Sulawesi. One of the aims of the research was to document the species richness of the expedition's study site in lowland moist forest. Various recording methods were used, including malaise traps, pitfall traps, yellow water-filled trays, flight interception traps, light traps and fogging of the tree canopy. Variations in species richness were noted over 24-h periods and during the year. Changes in the beetle fauna around a recently fallen fig tree were also recorded as the tree decayed. Mr Hammond illustrated his talk with slides of some of the colourful beetles seen in Sulawesi. About 6000 species of beetle were recorded by the expedition. Catches in malaise and flight interception traps indicate that the beetle diversity in Sulawesi was four to five times as rich as temperate woodland such as the New Forest.

BENHS FIELD MEETINGS

Woodwalton Fen NNR, Cambs., 3 June 1989

Leaders: **P. Waring and P. Kirby**. Report on insects other than Lepidoptera. A select band of diurnal entomologists hunted over the fen until the arrival of the moth-trapping hordes in the late afternoon. Amongst them, three determined non-Lepidopterists endeavoured to make up in diligence and vigour for what they lacked

in numbers. A full day's work in pleasant weather, marred only by a single short shower, facilitated the production of good species lists, particularly for Coleoptera, Diptera and Hemiptera. A total of 209 species were recorded, including a number not previously known from the fen and several national rarities. Two uncommon species of reed-feeding planthopper, *Chloriona dorsata* Edwards and *C. vasconica* Ribaut were found in the fen for the first time, even though the group has been surveyed there on previous occasions. *C. dorsata* was widespread and rather common, and occurred quite close to the entrance. It has presumably either recently colonized the fen or has undergone a very great increase in frequency. A single specimen of the planthopper *Criomorphus williamsi* China from the margin of a drove appears to be new for v.c.31. The water beetles of the fen are rather well known, and no great effort was put into searching for them. However, examination of a series of very shallow pools in a recently cut plot of mixed fen vegetation produced a surprisingly impressive list, including *Agabus undulatus* (Schr.), *Hydaticus seminiger* (Deg.), *Hydrochus carinatus* Germ. and *Helophorus nanus* Sturm. A single *Agabus uliginosus* (L.) was caught flying along one of the droves. A small colony of the reed beetle *Plateumaris braccata* (Scop.) was found, in exactly the same place that it later transpired that it had been found by J.H. Bratton in 1986. Amongst the Diptera, uncommon Sciomyzids included *Pherbellia dorsata* (Zelt.), *Pteromicra angustipennis* (Staeger) and *Antichaeta obliviosa* Enderlein. The latter species, only recently added to the British list, has been previously taken at Woodwalton Fen by S.J. Falk on the 28.v.85, but is currently known from only three other British sites. Chloropids included the rare reed-galling *Lipara similis* Schiner, which was recorded from several compartments, *Siphunculina aenea* (Macq.) and *Dicraeus raptus* (Haliday).

Hayley Wood, Cambs., 14 October 1989

Leaders: **P. Kirby** and **S. Lambert**. Three members, including the leaders, graced this meeting. The others can perhaps be forgiven for staying away. It had been hoped that a meeting at this time would catch the last hints of the summer's glory if the season were late, and provide an entertaining time amongst the fungi and leaf mould if winter had decided to put in an early appearance. In practice, it was timed perfectly for peak leaf fall, and the year had been so dry that scarcely a hint of fungal growth marred either the ground or the timber. An outstanding crop of acorns made any attempt at working the oak trees a painful experience. The shrunken, duckweed-coated remnant of the armed pond was reached with difficulty and an arm outstretched over deep black mud. The weather was pleasant enough in the centre of the wood, but a sharp wind blasted the outskirts, bringing with it a powerful stench of rotting flesh from the maggot farm immediately upwind. Escapee blowflies from this farm were by far the commonest insects seen. A good number had been attacked by fungi, and their corpses were rooted firmly to tree trunks, stumps and leaves by white hyphae. A coleopterist with determination and a very strong stomach would probably have been a valuable addition to the entomologial team: a man-high pile of decaying animal fragments on the outskirts of the wood looked ripe for sieving, but we remained at a respectful distance. Stalwart braving of the difficulties of the day produced a total of 58 invertebrate species. No great rarities are included, but a few could with justification be regarded as local, and there are a number of additions to the wood's species list. The one bracket fungus investigated produced *Cis nitidus* (F.), *Ennearthron cornutum* (Gyll.), *Biphyllus lunatus* (F.) and *Mycetophagus*

quadripustulatus (L.). The flea beetle *Aphthona euphorbiae* (Schr.) unexpectedly turned up in considerable numbers in oak trees. Amongst the planthoppers, *Forcipata forcipata* (Flor) and *Aphrophora salicina* (Goeze) raised the tone of the list a little, but the best species of the day was *Idiocerus vittifrons* Kursch. from *Acer campestre* L. the field maple.

SHORT COMMUNICATIONS

***Ptinus subpilosus* Sturm (Coleoptera: Ptinidae) in Somerset.** — A single example of *Ptinus subpilosus* was found beneath loose webby bark on an old oak in Nettlecombe Park (ST 0537), near Williton in S. Somerset, 6.vi.1988. The species is not included in the county list (Wilson, 1958) and I am unaware of any subsequent report. It is an important addition to the saproxylic fauna of this very interesting site — which has been described elsewhere (Alexander, 1988). — K. N. A. Alexander, 22 Cecily Hill, Cirencester, Glos. GL7 2EF.

References

Alexander, K. N. A. 1988. A relict old forest beetle fauna from Nettlecombe Park in Somerset. *Br. J. Ent. Nat. Hist.* **1:** 128.

Wilson, W. A. 11958. *Coleoptera of Somerset.* Somersetshire Archaeological and Natural History Society.

***Ampedus elongantulus* (F.) (Coleoptera: Elateridae) new to Dorset.** — An elytron of *Ampedus elongantulus* was found in a spider's web beneath loose bark on an ancient oak in Sherborne Deer Park (ST 647167), 28.xii.1989. I understand from Howard Mendel (pers. comm.) that this is a new county record.

There has been a deer park at Sherborne since at least 1161 (Cantor, 1983), although the present site is immediately to the east of 'Old Park' and — judging from its structure — was probably developed from an area of ancient woodland. The tree composition is oak, ash, field maple and beech, with a few planted non-natives. All appear to be maidens, and there appears to be no evidence of the practice of pollarding which is so typical of medieval deer parks. There is also a good scatter of hawthorns and hazel.

The saproxylic beetle fauna so far recorded indicates that this site probably supports a very interesting relict old forest beetle fauna. In addition to *Ampedus elongantulus*, I have also found *Ctesias serra* (F.) and *Phymatodes testaceus* (L.), both 3.i.1988, *Pediacus dermestoides* (F.), *Eledona agricola* (Herbst), *Cerylon ferrugneum* Stephens, and *C. histeroides* (F.), all 1.v.1988, and *Sinodendron cylindricum* (L.), *Bitoma crenata* (F.), and *Agrilus sinuatus* (Olivier), 28.xii.1989. Many of these refer to larvae or pieces of adults, none of the visits having been during the summer.

Sherborne Deer Park is likely to be the 'Sherborne' locality referred to by Pearce (1926), who recorded *Trichonyx sulcicollis* (Reich.) and *Ischnomera caerulea* (L.) in the 1920s, and commented that it was proving to be a good centre.

My thanks to Howard Mendel for confirming my identification. — K. N. A. Alexander, 22 Cecily Hill, Cirencester, Glos. GL7 2EF.

References

Cantor, L. 1983. *The medieval parks of England: a gazeteer.* Department of Education, Loughborough University of Technology.

Pearce, E.J. 1926. A list of the Coleoptera of Dorset. *Proc. Dorset Nat. Hist. Ant. Field Club* **47**: 51–128.

ANNOUNCEMENTS

I am currently preparing a Royal Entomological Society Handbook to the flower-feeding Nitidulidae (*Meligethes*, *Pria*) and Kateretidae (*Brachypterus*, *Brachypterolus* and *Kateretes*). I would very much appreciate examining members' collections of these genera, particularly for specimens cited in the Society's *Proceedings and Transactions* and *Journal*. I will be pleased to identify small series for confirmation and identification whenever required.—Ashley H. Kirk-Spriggs, Sub-Department of Entomology, National Museum of Wales, Cathays Park, Cardiff CF1 3NP.

The Editor has a few off-print copies of the colour plates from the 1989 Annual Exhibition that appeared in the last issue of the *Journal*. These will be available to interested parties at the A.E.S. Annual Exhibition and B.E.N.H.S. Annual Exhibition.

The Society would be interested in buying back from members copies of *Proc. Trans. Br. Ent. Nat. Hist. Soc.* Volume 20, Part 1, April 1987 (The British Argyresthiinae and Yponomeutinae) by D.J.L. Agassiz. Please contact the Editor.

The Professor Hering Memorial Research Fund

The British Entomological and Natural History Society announces that awards may be made from this Fund for the promotion of entomological research with particular emphasis on:

(a) Leaf-miners
(b) Diptera, particularly Tephritidae and Agromyzidae
(c) Lepidoptera, particularly Microlepidoptera
(d) General entomology

in the above order of preference having regard to the suitability of candidates and the plan of work proposed.

Awards may be made to assist travelling and other expenses necessary to fieldwork, for the study of collections, for attendance at conferences, or, exceptionally, for the costs of publication of finished work. In total they are unlikely to exceed £600 in 1990/91.

Applicants should send a statement, if possible in sextuple, of their qualifications, of their plan of work, and of the precise objects and amount for which an award is sought, to Dr M.J. Scoble, Department of Entomology, The Natural History Museum, Cromwell Road, London SW7 5BD, as soon as possible and not later than 30 September 1990.

BRITISH JOURNAL OF ENTOMOLOGY AND NATURAL HISTORY

Volume 3, Part 3, August 1990

INSTRUCTIONS TO AUTHORS

Contributions must be double-spaced with 3cm margins either side to facilitate marking up. They should be typed if possible, on one side only of A4 paper. Layout should follow that of the journal, but apart from underlining scientific names, no marks should be made to define typeface.

Line and continuous tone figures are accepted. Writing on figures is best listed separately for setting and its placing indicated on a duplicate figure. Seek advice before drawing. Reduction may otherwise necessitate redrawing.

Authors of original papers of more than one page qualify for 25 free reprints. Extra copies (prices on application) must be ordered when proofs are returned.

MEETINGS OF THE SOCIETY

are held regularly and the well-known ANNUAL EXHIBITION and ANNUAL DINNER are planned for the 27th October 1990 at Imperial College, London SW7.

Frequent Field Meetings are held at weekends in the Summer. Visitors are welcome at all meetings.

The current Programme Card can be had on application to the Secretary at 32 Penton Road, Staines, Mdx. TW18 2LD.

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London members £11.50. Ordinary members £6.50. Juniors £3.00. Send to: Asst. Treasurer, Mar-y-Mar, Minster Drive, Minster-in-Sheppey, Kent, ME12 2NG.

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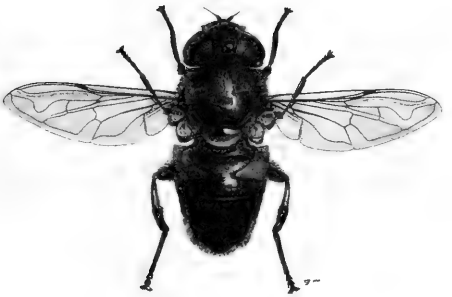

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IMPORTANT ANNOUNCEMENT

At the end of 1989 the Society vacated its rooms in the Alpine Club. Until the Society moves into new premises, the library and collections will be put into storage. Indoor meetings will be held at the Royal Entomological Society, 41 Queen's Gate, London SW7 on the second and fourth Wednesdays of each month. **The Journal will continue to be published as normal.** Without a permanent address, it is important that members have clear and easy communication with the various officers to ensure the continued smooth running of the Society. The following is a list of useful addresses.

Subscriptions and changes of address to the Assistant Treasurer: G. N. Burton, Mary-Mar, Minister Drive, Minister-in-Sheppey, Kent ME12 2NG.

Applications for membership to the Membership Secretary: A. Godfrey, 10 Moorlea Drive, Baildon, Shipley, W. Yorks, BD17 6QL.

Non-arrival of the Journal, faulty copies or other problems arising from distribution of the Journal or notices to the **Distribution Secretary:** D. Young, 32 Valley Road, Burghfield Common, Reading, Berks RG7 3NF.

Orders for books and back numbers of the Journal and Proceedings to the Sales Secretary: R. D. Hawkins, 30d Meadowcroft Close, Horley, Surrey RH6 9EL.

Orders for Christmas Cards to: R. K. Merrifield, 22 Kingswear Road, Ruislip Manor, Middx. HA4 6AY.

General Enquiries to the Secretary: J. Muggleton, 30 Penton Road, Staines, Middx TW18 2LD (Tel: 0784-464537).

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THE VICTORIAN NATURALISTS AND THE THEORY OF EVOLUTION

MARTIN HENDERSON

13 Kimble Road, Colliers Wood, London SW19.

It is widely admitted that natural history first became a truly popular activity in Victorian times. But there is an ambivalence to the phenomenon of Victorian natural history—it is claimed that it relied too heavily on anthropomorphism, anecdote, and the ideas of natural theology (Barber, 1980). These criticisms have some basis but they are simplistic: in an article which takes this view Farber (1982) goes further. 'Nowadays historians most often present nineteenth century natural history as a discipline emeritus and its practitioners as dowager scientists. This simply will not do'.

The determination to classify and describe was worthy and the work of Darwin and his colleagues, especially Joseph Dalton Hooker and Thomas Henry Huxley was inspired. Imprecision is inevitable in dealing with a unit as large as the entire natural world.

IDEAS ABOUT THE ORDER OF NATURE BEFORE DARWIN

In natural history, as in geology, there have been a series of different explanations to account for observed phenomena in nature, gradually approximating more and more to modern views. For many hundreds of years, bestiaries and herbals, with all their inaccuracies and fanciful notions, were considered authoritative.

An influential idea, the 'chain of being', held that organisms fell into a natural sequence of increasing complexity, from the very simplest to man. The Swiss philosopher Charles Bonnet and Jean-Baptiste Robinet, a Frenchman, were among the proponents of the idea but it was mixed up with more speculative and fanciful notions in their formulations.

Some of the relationships Bonnet expressed seem odd today—asbestos, being fibrous and vaguely 'organic' in appearance, came before the simplest forms of life in the chain, and reptiles were placed lower on the scale than fish, which linked with birds.

However, these two did come to see the chain of being as progressive, 'temporalizing' it. Initially 'germs' were created by God and these developed or unfolded into successive forms of life, the whole pattern being foreseen by God (see Bowler, 1984). Thus the more advanced ideas did allow for changes of life on earth, but not open-ended ones—man was considered the summit of creation.

John Ray and Carolus Linnaeus were well aware of the idea of the 'chain of being' and Jean Baptiste de Monet, Chevalier de Lamarck based the first integrated evolutionary explanation for life on earth on this starting point. According to Lamarck, each point on the scale or chain of being has been derived from a separate act of spontaneous generation. The lower down the scale the organism, the more recently its first ancestor was produced by spontaneous generation. This aspect of Lamarck's thinking is less well known today than ideas about use and disuse of organs and their inheritance.

Lamarck was derided for these views in his day by his colleague Georges Cuvier at the Museum D'Histoire Naturelle. Cuvier laid emphasis on the study of internal structure, and believed that structure was so elegantly and delicately adapted to function in each species that evolutionary progression from one animal to another

would be impossible. Cuvier grouped animals into four main types on the basis of his studies, the Vertebrata, Mollusca, Articulata and Radiata. Three of these represent a basic pattern of animal organization, and in this respect Cuvier's classification was very advanced. In another way Cuvier's views were less advanced, for he believed there was a strict, an invariant relationship between particular conditions and particular organic structures. He was one of the founders of a mode of interpreting organic structure, the school of Paley and the Bridgewater Treatises. The idea is derived originally from the biblical account of the creation, and refers back to it: the fact of creation is an adequate explanation for adaptation. The idea can be considered strictly teleological (related to the doctrine of the final causation of things). Here then is one of the main philosophies of nature in the 19th century.

By the middle third of the 19th century most of the leading naturalists were opposed to any strictly teleological interpretation of organisms, including Owen, Agassiz and many others. Owen and Agassiz articulated transcendentalist philosophies: Agassiz looked for conceptual connections between vertebrates and, finding them he argued that we can see a progression in today's vertebrate world—fish, reptiles, and so on, up to mammals and man. He promptly read this progression into the fossil world too. Agassiz was no evolutionist; between the progressive classes he saw unbridgeable gaps.

Owen was responsible for the ideas of archetypes, and applied the term to the vertebrate skeleton. The fore-limb of the mole, the dugong, the wing of the bat all had the same skeleton of bones, and Owen claimed that they showed homology (a pre-Darwinian use of the term). He devised an archetype for the vertebrate skeleton.

These naturalists remained committed to the belief that the universe shows order and purpose. Their rejection of teleological explanation did not entail at the same time a split from the traditional philosophies of nature, founded on Christian views. Here Darwin did differ, and the fact that he did so, on such sensitive grounds, explains much of the furore over the 'Origin'.

Consistent with religious and ethical norms, the views of Richard Owen and Louis Agassiz demonstrate the relation of science to wider social factors, as do the ideas of natural theology. They stressed a divine plan in, for example, vertebrate structure, and went to great lengths to demonstrate it.

By now the discrepancies of a linear scheme, or 'chain of being' were apparent and obtrusive and the metaphor of a tree of life to represent branching in natural life over time was more often used. In 1844 Robert Chamber's *Vestiges of the natural history of creation* was published anonymously and the gentlemanliness of the debate about organic origins ended abruptly. This work was full of evolutionary speculations of a revolutionary order and provoked invective more bitter than any that greeted the 'Origin'.

Natural history in the 19th century

The focus of natural history on the description and classification of natural objects changed subtly in the 19th century. There were more travellers, writers and naturalists. Aesthetic pleasure and edification were held as motives for studying natural history, in a plethora of books on the subject which often adopted a euphoric tone in description. At this, amateur end of the spectrum 'It was the singularity of natural objects and phenomena, coupled with their diversity, which lent them their charm. The exciting revelations possible, of new species, new modes of life, heightened one's sense of nature as boundless, inexhaustible. With a microscope a naturalist could pursue specimens even into the mysterious microcosm. The closer

one looked the more one saw—the microcosm brimmed with details' (Merrill, 1989). The aquarium, Wardian cases for growing ferns as well as the microscope became available for the first time to those with leisure to use them. The poorer amongst the population were not completely closed off from such pursuits, especially in areas such as entomology where much could be done with simple equipment, and the railways made the population much more mobile.

Able and confident scientists exerted pressure for increasing and improving scientific studies in Cambridge and London. More often, scientists had a central preoccupation with the foundations of the order of nature, the species–variety distinction and questions of geographical distribution. In the milieu of the disputes of the 19th century, anatomy was the storm-centre, strange as it may seem. The skeletons of birds and beasts, living and fossil, were examined for what they revealed about the key truths of nature.

Amateurs brought a fresh point of view to their studies, and the amateur–professional distinction acquired a healthy tension. Naturalist/collectors on trips of exploration returned with more, and scientifically more valuable specimens and large museum collections began to develop. As faculties of science started up in the main universities descriptive morphology, with its emphasis on mechanics of structure and function, and descriptive embryology, giving it more definition, became truly scientific. More and more of the major contributions were detailed monographs intended for sustained study.

Charles Darwin and the theory of evolution

Charles Robert Darwin (1809–1882) enjoyed the benefits of wealth and privilege accorded to very few, coming as he did from an illustrious and intellectual family. As an undergraduate, Darwin had read Paley on natural theology with admiration. This was the conventional wisdom: Oxford and Cambridge had a few chairs in natural sciences but those who held them (for example, Adam Sedgwick and William Whewell) were always religious and usually ministers of religion. When their ideas were overturned, there was a Kuhnian 'shift in the paradigm'—a change and unification of theoretical viewpoint, affecting many sciences in the study of life processes. At the start of the voyage of the Beagle, in 1831, Darwin was still conventionally religious (his father had led him to consider joining the church). But the voyage transformed his outlook on all aspects of natural history. He turned to naturalistic explanations of phenomena, these leading him eventually to run counter to traditional scientific and religious thinking about the order of nature. The problem was to present the scientific establishment with the new thinking in a convincing manner.

Catastrophism versus uniformitarianism

These terms were coined by William Whewell, not himself a practising geologist, to formalize the debate within geology. At one extreme was the thinking of Cuvier. Finding that the fauna of the Paris basin changed dramatically from freshwater deposits to marine and back again in alternating strata, Cuvier postulated a series of 'revolutions'. These wiped out much of the existing fauna and facilitated extensive migration and the development of new forms. The eccentric Cambridge geologist William Buckland believed he had discovered incontrovertible evidence of the biblical deluge, the most recent 'revolution' or catastrophe (Reliquiae Diluvianae, 1832).

At the other extreme, Charles Lyell was a uniformitarianist, who espoused the three cardinal principles of actualism, uniformity and a steady state in the first volume of his *Principles of geology* published in 1830. The forces acting on the earth were the same in kind in geological time as could be observed in the present day.

Darwin a uniformitarian

When he set off for South America, Darwin took with him the first volume of Lyell's 'Principles' and the second volume reached him in Montevideo in 1832. As soon as he started work in earnest, at Saint Jago in the Cape Verde Archipelago, Darwin started thinking in a Lyellian fashion. In particular, reasoning from a general layer of sedimentary rock some 60 feet above the ground, Darwin concluded that the whole island had been gradually elevated, and he noted that there had also been later subsidence around volcanic craters. He later used Lyellian uniformitarian concepts in his observations on the geology of South America, and for his work on coral reefs. He owed a major intellectual debt to Charles Lyell, as he acknowledged in his autobiographical work.

Lyell on Lamarckism

But Lyell in the second volume of the *Principles of Geology* vigorously attacked the notions of progressive change then common knowledge, the ideas of Lamarck. He considered Lamarck's ideas fully and at length and finally rejected them. He is left with the problem of explaining the introduction of new species by some alternative manner: Lyell is very hazy on this point, but he implies a mechanism involving the laws and causes of this world rather than direct supernatural intervention (see Ruse, 1979). He does not hint at what non-evolutionary animal speciation would be like.

Anyway, geology was still at a stage when progression in the fossil record could sensibly be denied, and Lyell denied it. Fish had been discovered fossilized in Devonian strata and he saw no reason to expect that mammals would not turn up there too. In fact he hoped they would, for their discovery would make an evolutionary explanation for the development of life on earth less likely. Lyell was adopting a conservative stance because, if evolution occurred, he knew man would be implicated. And Lyell's religion gave man a special place at the head of creation.

Darwin's views on species

Some of Darwin's journal entries indicate that he accepted these ideas of Lyell in his day-to-day work of describing his experiences, collecting specimens and geologizing. In no sense did Darwin's theory emerge fully formed during the voyage. However his observations did work against Lyell's views. Darwin himself had discovered giant sloths and armadilloes as fossils in South America, which except in their large size were similar to extant forms. His practical palaeontological work convinced him of progression, and he was also noticing changes in species distribution across the continent of South America, and the strange fauna of the Galapagos Islands. Geographical distribution was, eventually, a key area in the 'Origin' and one aspect of his argument which defied rebuttal.

The development of the theory

It was when Darwin was sorting his collections and having them examined by experts that he was converted to evolution. Of course the theory of evolution, simple

as it appears on first sight, is not really simple. In the final formulation Darwin was expounding four ideas, to varying degrees unwelcome. The basic idea of transmutation, the principle of naturalism, the concept of branching adaptive evolution and natural selection itself (see Kohn, 1985). The idea of naturalism overthrew the 'argument from design'.

However in July 1837, when Darwin opened the first of his 'transmutation' notebooks, the 1859 formulation of his views was still 20 years ahead. In these now famous notebooks Darwin recorded his ideas informally. The tenor of the notebooks is probing, and tentative, not the discursive logic of his published works. Indeed this was the only way Darwin could have approached the problem as the relative importance of each facet of it was not apparent and had to be determined. The nature of the thinking is tortuous and helical. Notions are thrown into the field, debated, and often rejected. Some of Darwin's early speculations relate to the spontaneous generation of monads—initial germs. Monads develop and gradually become more complex and when one dies out this accounts for the extinction of species or whole groups of species (Gruber, 1974). The idea of monads is strongly reminiscent of Lamarck. But the idea of monads soon disappears from the second notebook, (and Darwin does not consider the problem of the first appearance of life on earth in depth in *The origin of species*).

Darwin mentions natural selection several times in his notebooks before he reads Malthus. The idea was widely recognized then, but conceived of as a conservative force, a mechanism that could eliminate the unfit or deviations from the norm. He was very early on aware of the importance of geographical isolation, and in common with Wallace used the metaphor of a three-dimensional, branching tree for organic nature.

In his short autobiography Darwin wrote: 'I soon perceived that selection was the keystone of man's success in making useful races of animals and plants. But how selection could be applied to organisms in a state of nature remained for some time a mystery to me. In October 1838, that is, fifteen months after I had begun my systematic enquiry, I happened to read for amusement Malthus on 'Population' and, being well-prepared to appreciate the struggle for existence which everywhere goes on, from long-continued observation of the habits of animals and plants, it at once struck me that, under these circumstances favourable variations would tend to be preserved, and unfavourable ones destroyed. The result of this would be the formation of new species. Here, then, I had at last got a theory with which to work. . . .' (Darwin, 1908)

In developing this insight from Malthus (really just the final piece of the jig-saw, the keystone of the arch), Darwin was greatly influenced by the work of two of the foremost contemporary philosophers of science, John Herschel and William Whewell. Their ideas on scientific method and the concept of a 'vera causa' led him to emphasize artificial selection despite the sterility of hybrids, and encouraged him to view natural selection and sexual selection as analagous processes.

The precise nature of the influence of Malthus has been analysed by the late Dov Ospovat (1981), who believes that Darwin was led to conclude that the natural selection of variations could not be reconciled with traditional views of a 'plan of creation'. He came to believe that there was no exact plan, that everything was the result of 'designed laws' but that the details are left to the working out of 'chance'. This was a very significant divergence from contemporary opinion. Interestingly, according to Ospovat, Darwin was much slower to reject the notion of 'perfect' adaptation. In the sketch and later essay, he retained the idea that within the limits imposed by the laws of heredity and the accidents of transport, the native inhabitants of an area are perfectly adapted. The idea of relative adaptation described in *The origin of species* came later.

As is common knowledge, Darwin did not immediately publish the theory. He must have been aware that it had profound philosophical and religious implications that would be disturbing to many—including in fact, his own devotedly religious wife. He expanded the notebook entries into preliminary essays, the first in 1842 and a much longer version in 1844. These remained unknown except to Joseph Hooker, one of Darwin's closest colleagues. Until 1846 he was still working on the geological observations he had made during the Beagle voyage. Then he embarked on the systematics of barnacles, which he dissected at home in Downe, and this work resulted in a four-volume treatise and took him until September 1854. Only after that date did he begin sorting material for his species theory and in May 1856 commenced writing 'Natural Selection', another voluminous work which was never completed. Work on it was interrupted, fortunately for science, by the letter from Alfred Russel Wallace, which arrived in June 1858. Thus Darwin was led to write *The origin of species* at speed in the next months, and it was published by John Murray in November 1859.

Once Darwin's theory was published it created a degree of controversy similar to such developments as nuclear fission and brain surgery later. It directly challenged much of the thinking of such towering figures as Richard Owen and Louis Agassiz, the vision of orderly progression through transcendental law, the dominant ideology of the 1840s. It gave the 'coup de grace' to the preceding system of natural theology.

It was natural that those who cherished these theoretical systems should resent their being challenged. But Darwin did not lack supporters. Thomas Henry Huxley became as visible publicly as a scientist as Agassiz and Owen, and his article on Archeopteryx published in 1868 was almost a confession of evolutionary faith. Joseph Dalton Hooker, began using (and therefore endorsing) evolutionary theory in his *Flora of Tasmania* (1860)—he had been let into the secret of natural selection in 1844, though he was not then converted. There were also those who became, in their scientific work, casualties: Sir Charles Lyell was saddened that human life seemed, after all, part of nature and not somehow 'beyond' it and Philip Henry Gosse, a fundamentalist, was derided for 'Omphalos'.

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REDESCRIPTION OF THE PUPAL EXUVIAE OF *POTTHASTIA MONTIUM* EDWARDS (=*IBERICA* SERRA-TOSIO SYN. NOV.) (DIPTERA: CHIRONOMIDAE)

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In the key to the pupal exuviae of British Chironomidae (Langton, 1984), a pupal form widespread in hilly regions in Britain is identified as *Potthastia montium*. That identification was little more than a calculated guess: the hypopygium of the only reared specimen (leg. A. Brennan) is identical to that described for *iberica* by Serra-Tosio (1971), but the absence of any pupal form for *montium* in collections from suitable regions of Britain suggested synonymy. In 1987 Dr P.S. Cranston at the British Museum (Natural History) remounted the hypopygium of one of Edwards' specimens in the presence of one of the authors (P.H.L.), which showed it to be similar to that of described *iberica*. Professor B. Serra-Tosio has compared the reared specimen of *montium* with his *iberica* and confirms that they are the same species.

P. iberica was described by Serra-Tosio from a single male collected near Grenade in the Spanish Pyrenees. In 1985, Doughman described the pupal exuviae of *iberica* from material collected in Georgia, Idaho and Wyoming in the USA. Here we give a redescription of the exuviae of *montium* (=*iberica*) from material collected in the French Pyrenees and Britain.

Redescription of pupa (n=10)

Total length of male exuviae 6.05–6.30 mm, of female 6.85–6.95 mm. Length of abdomen; males 4.60–4.72 mm, females 4.95–5.05 mm. General colour brownish in French populations, golden in British populations. Thorax with a dark median transverse band. Abdominal segments VI–VIII darkened laterally. Frontal apotome (Fig. 1): frontal setae 206–209 μm long, 102–111 μm apart. Thorax (Fig. 2) without granulations; with two median and one antepronotal setae (95–96 μm long), three dorsocentral setae (dcs2 and dcs3 66–72 μm long, dcs4 66–81 μm long; dcs1 missing) and two metanotal setae (37–39 μm, 51–54 μm long), without supraalar and prealar setae. Abdomen (Figs 3,4). Lateral setae of segments I-VIII: 3,4,4,4,4,4,4,2; lateral, dorsocentral and ventrocentral setae on segments VII and VIII simple or branched. Shagreen present on tergites II–VIII and sternites I–VIII arranged as on Figs 3 and 4. Apical bands of spinules present on tergites II–VI, the spinules larger than the posterior points of the tergite shagreen. Posterior angle of segment VIII acute.

Anal segement (male Fig. 5, female Fig. 6). Apical projection of anal lobes triangular, sclerotized and overreaching the lobe by 30–33 μm; 10–15 small sharp teeth present anterolaterally at the insertion of the anal macrosetae; macrosetae short (197–230 μm long), stout, not curved at apex. Male genital sac somewhat conical. Female anal segment more sclerotized than male.

Material examined

France: 4 ♂, 3 ♀ pupae; 31 ♂, 36 ♀ pupal exuviae. French Pyrenees: St Engrace

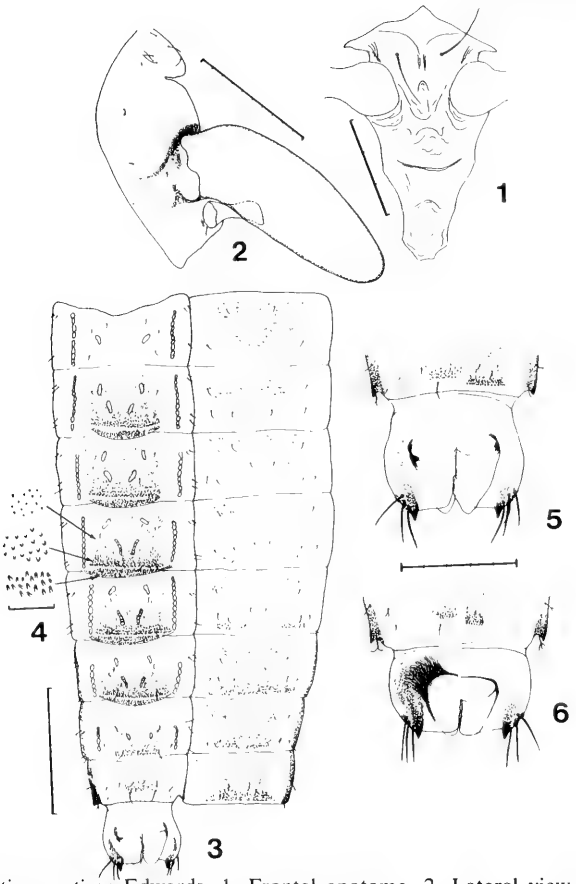

Fig. 1–6. *Pottastia montium* Edwards. 1. Frontal apotome. 2. Lateral view of thorax. 3. Abdominal armament; dorsal on left, ventral on right. 4. Detail of the armament of tergite IV. 5. Male anal segment; dorsal on left, ventral on right. 6. Female anal segment; dorsal on left, ventral on right. Scale line divisions on Figs 1, 2, 5 and 6, 0.1 mm; on Fig. 3, 0.5 mm; on Fig. 4, 0.01 mm.

River, 310 m, Larrau and Saison Rivers, 330 m and 220 m, 15/16.vi.87; Asped River, 650 m, 29.ix.88.

Wales: 3 ♀ pupal exuviae, Lake Bala, 160 m, 28.v.78; 1 reared ♂, River Wye, iv.82 (leg. A. Brennan).

Scotland: 6 ♂, 3 ♀ pupal exuviae. River Don, Dyce, 30 m, 23.viii.82; River Tummel, Balanluig, 80 m, 26.v.88; Carie Burn, Rannoch area, 270 m, 14.v.85 (leg. J. Foster & S. Hogg); River Tay, Kinclaven, 40 m, 26.v.88.

England: 1 ♂, 3 ♀ pupal exuviae, River Duddon, Boothe Holme, 60 m, and Duddon Bridge, 5 m, 13.vi.77 (leg, R.S. Wilson).

Acknowledgements

We are indebted to Dr P.S. Cranston for details of Edwards' *montium* and to Professor Dr B. Serra-Tosio for confirming the synonymy.

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BOOK REVIEW

The moths and butterflies of Great Britain and Ireland, Vol. 7, Part 1, Butterflies, edited by A.M. Emmet and J. Heath. 380 pages, 24 colour plates, Harley Books, £49.50.—Originally planned to include some of the larger moths, the sheer wealth of available information on butterflies meant that an entire book would be required to do it justice and the moths were excluded. Thus we have what is intended to be the foremost reference on butterflies for the next few generations and really the last since South in 1906.

The first chapter gives an interesting account of the early literature and naming of butterflies, and the second deals with the topic of insect introductions/reintroductions. This is a subject not devoid of objectors and an entire chapter in a volume intended to last many years may seem to be overkill. An objective assessment shows it to be a learned and instructive read, detailing successful and failed butterfly introductions with careful consideration of the ecological factors involved. The subjective view of this reviewer is that this is a critical part of the book. Distribution and life histories of our butterflies are now pretty clearly understood and the study of butterflies is shifting from these areas to the wider concept of ecology. It is now vital that the requirements of butterflies are understood as suitable habitats decline and planned habitat management is the only way to protect many colonies. The studies of Jeremy Thomas and his colleagues detailed in this chapter illustrate the huge strides made in understanding butterfly ecology in recent years and whether or not one approves of introductions it is often only through them that the theories and practical applications of butterfly management can be tested, and it can only be to the benefit of our fauna that such work continues. We must hope that by the time this book is out of date the principles of ecology detailed here will be widely understood and practised.

The general text deals with each species on the British list and a number of others recorded very occasionally. The specialist knowledge of many entomologists has been employed in a great task of coordination, each species being dealt with by one or more of its own experts. There is a description of the imago and its variation, details of the life history and distribution (with the standard 10-km square maps) and a summary of the vernacular names in history. Each is dealt with in a thorough and scholarly manner (the 'full story' of the life history of *Maculinea arion* being especially so) as befits such a well studied group of animals. A few errors have crept into the text: one relates to *Argynnis paphia* in which it is stated that f. *valezina* 'occurs regularly in the New Forest but rarely elsewhere', echoing similar statements in earlier references. *Valezina* occurs regularly in other areas (Dorset and Wiltshire from personal experience) and whilst it was undoubtedly once most frequent in the New Forest, *paphia* itself is now almost a rarity in the Forest and *valezina* must be rarely seen. Two other small points relate to aberrations—ab. *bernhardi* of *Boloria*

selene is said to have 'a blackish median fascia on the forewings'. The illustration of this form clearly does not but ab. *pittionii* of *Boloria euphrosyne* (also illustrated) clearly does. The second point refers to *Polyommatus icarus* in which 'not uncommonly the spots are united or extended into dark rays as in ab. *radiata*' (illustrated). Certain spot extensions are common in *icarus* but those as extreme as *radiata* are very rare indeed.

Twenty-four plates by a new artist to the series, Richard Lewington, illustrate all species and many subspecies and aberrations. If any general critiism has been raised against this series so far it is that the plates have not always been of a quality to complement the text. The publication of Bernard Skinner's 'Moths' with its outstanding photographic plates seemed to end the long argument over photographs or paintings as the ideal illustrative medium for Lepidoptera. The present volume throws that argument wide open again and leaves one doubtful that either can ever be considered significantly the better. Lewington's paintings are of the highest order—I understand that each figure is painted twice life-size allowing the careful introductions of detail that is so remarkable when the paintings are scaled down. The shading on every vein and every nuance of crease or fold in the wings is convincingly reproduced as is the texture and lay of the hairs on the body; the skill of the artist being evident because rather than killing the painting with detail he has produced butterflies that are almost as fragile as the real thing. It is hard to believe that our butterflies have ever been painted better.

At just under £50 this book will not be considered a 'snip' and the major criticism one might level at it is that with the prospective cost in mind one or two areas might have been dealt with a little more succinctly. Given the quality of illustration, the worded descriptions of the adults, in all but a few cases, do not appear to be strictly necessary. Also 4 whole plates devoted to occasional migrants or accidental imports that have no real relevance to our fauna seems rather a lot. But it must be said that this book leaves all others in its wake for its breadth of expertise and coverage, and excellence of illustration, and for those who would spend £50 on any book then there can be few better buys on the market, for the price is not unreasonable.

Harley have maintained a fine reputation with this book and for the late John Heath, the originator and driving force behind the series, there can be no better placed tribute than that which opens this volume.

R.D.G. Barrington

NOTICE

Identification chart of British and Irish dragonflies. Harley Books, £4.99. This large poster has 87 coloured figures of the 16 species of damselfly and 23 species of dragonfly found in the British Isles. They are taken from R.R. Askew's book *The dragonflies of Europe,* published by Harley Books in 1988.

ERISTALIS PRATORUM (MEIGEN, 1822): A NEW BRITISH HOVERFLY

STEVEN J. FALK

Herbert Art Gallery and Museum, Jordan's Well, Coventry.

On 27.iii.1990 an afternoon visit was made to Ryton Wood, Warwickshire (SP3872) with some colleagues from the Herbert Art Gallery and Museum, Coventry to record various groups of insects. Eight species of hoverfly were seen, including the scarce *Criorhina ranunculi* (Panz.) in respectable numbers at sallow and sloe blossom. Males of *Eristalis pertinax* (Scop.) were plentiful in a woodland ride, but my attention was eventually drawn to a large female *Eristalis* basking on bare earth in an extensively disturbed, open area nearby. I captured it, being uncertain whether it might be *E. pertinax* or *E. tenax* (L.), the latter having not been seen that day.

Closer examination immediately revealed that it was not *E. tenax*, the eyes lacking the distinct hair bands, the hind legs without the entirely black, swollen tibiae, and the face without the broad central black stripe characteristic of that species. However, despite a close resemblance to *E. pertinax*, there were a number of features that were not typical of that species. The abdomen had the orange markings on the second tergite too bright and well defined for spring examples of *E. pertinax* (which are usually darker and furrier than summer examples) and most significantly, the mid-and fore-tarsi were blackish, not orange as in *E. pertinax*.

The last character is diagnostic in the separation of *E. pertinax* from the very similar non-British *E. pratorum*, a species that I had encountered in Israel and Crete during recent years. There was little doubt that this was the species just captured. Further confirmation of its identity was obtained through comparison with my foreign examples of *E. pratorum*, and reference to Van der Groot (1981).

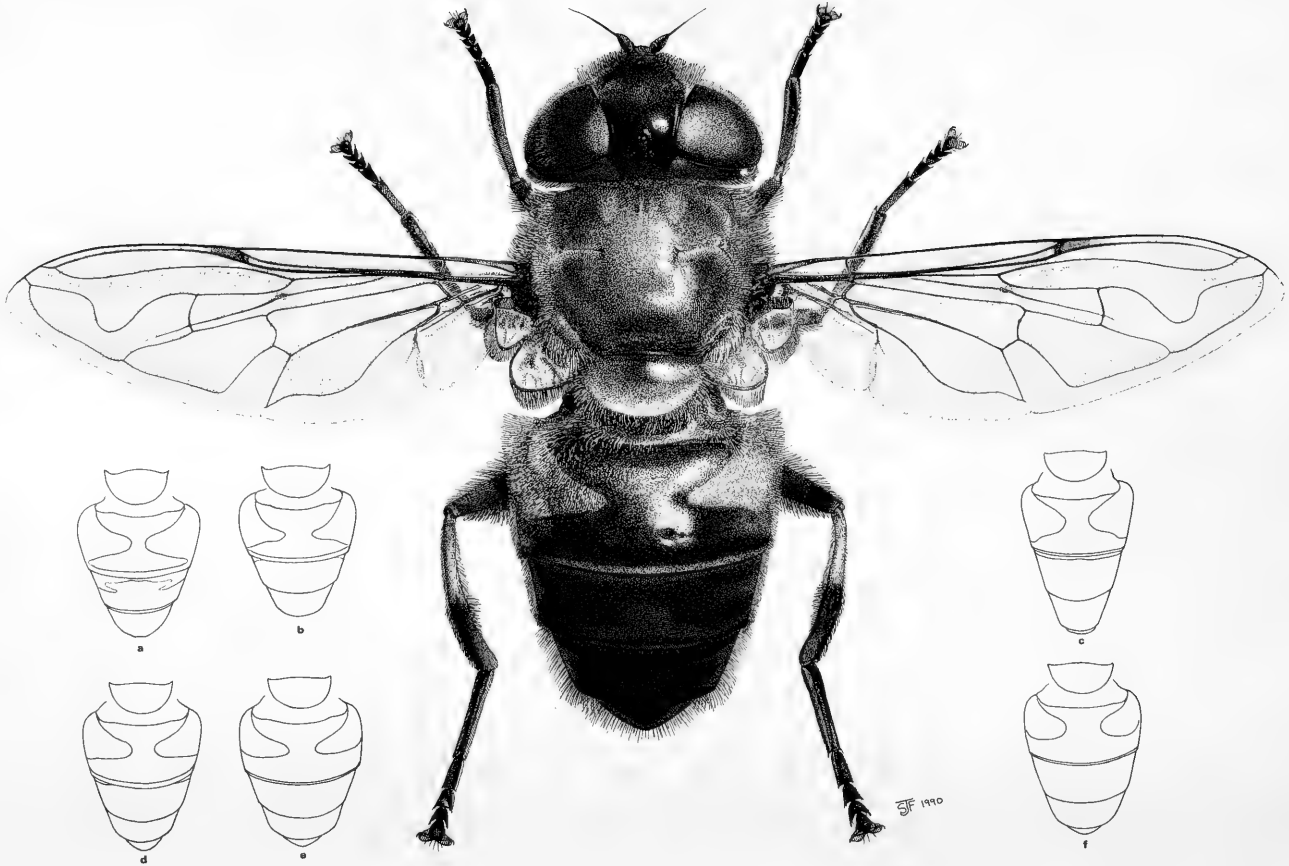
The possibility of this species turning up in Britain was recently noted by Speight (1988) and had often been discussed between myself and Alan Stubbs. However, no specimen of *E. pratorum* was found during my examination of extensive British series of *E. pertinax* in the Natural History Museum, London, where I was studying in 1984–5, nor in the syrphid collections of several other major museums that were seen whilst I was working for the Nature Conservancy Council between 1985 and 1990. No specimens were present in the collections of the Herbert Art Gallery and Museum, which includes much material from the site.

Abroad, *E. pratorum* is widespread in Europe, extending as far north as Finland and east into European USSR and Asia (Speight, 1988); also Israel, where it is regarded as a rare upland species and south-west Crete, where it was locally common in 1989 (personal data). Speight (1988) states that a variety of blossoms are visited, also the flowers of the umbellifer *Chaerophyllum*. All my Crete observations relate to adults on the flowers of various larger umbellifers including *Ferula communis* L. during April, with favoured habitats including flowery road verges, streamsides and ungrazed or fallow fields.

Despite several further visits to Ryton Wood and numerous other Warwickshire sites during April and May, no further *E. pratorum* specimens have been encountered.

FURTHER DISTINCTIONS FROM E. PERTINAX

The large size (average body length 15 mm) and broadly pale bases to the hind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tibiae mean that confusion is most likely with *E. pertinax*, from which the dark fore and mid-tarsi (orange in *E. pertinax*) are diagnostic. Other more subtle differences are listed below.

Males. Abdomen distinctly shorter and broader (Figure 1), resembling the much smaller *E. interrupta* (Poda) (=*E. nemorum* (L.) of Stubbs & Falk, 1983) in proportions and colour pattern. Tergite 3 about twice as wide as long (1.5 times in *E. pertinax*). Orange spots on tergite 2 narrower and less triangular than *E. pertinax* (where they usually form semi-equilatral triangles). Mesonotum more uniformly coloured, with any darker patches rather poorly pronounced (usually distinct in *E. pertinax*). Wings always clear (usually at least a faint darker smudge in the middle in *E. pertinax*). Head capsule proportionately slightly larger when viewed from above. Differences in the male genitalia are figured by Speight (1988).

Females. Usually slightly more robust than *E. pertinax,* with a broader abdomen (though some *E. pertinax* can attain this build). Upper part of occiput immediately behind the eyes distinctly grey-dusted, contrasting with the darker, undusted central part immediately behind the frons and vertex (upper occiput completely undusted in *E. pertinax* and hence lacking this contast). Mesonotum very uniformly coloured and paler than *E. pertinax*, where distinct dark patches are present (involving a pair of dark median stripes anteriorly and dark lateral patches, one pair in front of the mesonotal suture, one pair behind). Head capsule proportionately slightly larger when viewed from above, the lower face usually slightly broader and more diverging when viewed from the front.

Individual *E. pratorum* populations do not seem to exhibit the pronounced variation of abdominal markings found in species such as *E. tenax* and *E. arbustorum* (L.), nor the marked seasonal dimorphsm of *E. pertinax*. The small amount of geographic variation evident between my Israeli and Cretan material is highlighted in Figure 1.

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Fig. 1. *Eristalis pratorum* (Meigen), female from Ryton Wood, Warwickshire. Inserts: abdomens of *E. pratorum* and *E. pertinax* (a) *E. pratorum*, male, Israel. (b) *E. pratorum*, Crete, male (c) *E. pertinax*, male, typical British example. (d) *E. pratorum*, female, Israel. (e) *E. pratorum*, female, Crete. (e) *E. pertinax*, female, typical British example, though highly variable.

SHORT COMMUNICATIONS

***Leopoldius brevirostris* (Germar) (Diptera: Conopidae) recorded at MV light.**— On the 13. vii. 1990, whilst operating two 125–watt MV light traps for the purpose of recording moths in a woodland near Worthing in West Sussex (VC13) (OS grid ref. approx. TQ100049) I noted a conopid fly in one of the light traps. My provisional determination indicated *Leopoldius brevirostris* (Germ.), an identification later kindly confirmed by Dr S.G. Ball. The specimen, a female, was also shown to Mr D.K. Clements who agreed with the determination, although the frons appears atypical in that it is not wholly black.

The traps were operated under a canopy of oak, which were probably about 150 years old, where the bulk of the understorey had been cleared. Surrounding woodland was more dense and comprised oak, ash, maple, hazel and hawthorn. Dead wood was an abundant resource. The night was breezy with a clear, starlit sky, the temperature was not recorded.

As this species is probably parasitic on social wasps, possibly of the genus *Vespula* (Hymenoptera) (Smith, 1969), it may be worth reporting here that an example of the bee moth *Aphomia sociella* (Linnaeus) (Lepidoptera, Pyralidae) was also recorded. The larvae of this species are found in the nests of bees and wasps (Goater, 1986). This suggests that this micro-habitat was available to the fly in the area.

This is apparently the tenth British example of this species (D.K. Clements, pers.comm.) the species being previously recorded from Berks., Cambs., Glos., Hants., Oxon., Worc., Surrey and Kent (Clements, 1989).— M. Parsons, The Forge, Russells Green, Ninfield, nr.Battle, East Sussex.

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Are pink sawflies distasteful to spiders?—On 22.vii. 1990, in Nunhead Cemetery, London SE15, I saw a small orange-pink sawfly (something like *Nematus ribesii* Scop.) fly straight into the circular orb web of the garden spider *Araneus diadematus* Clerk. But instead of struggling to free itself, the sawfly folded its wings and held its legs and antennae close to its body, feigning death and hanging motionless from the three or four strands of silk which had ensnared it. The spider, at the centre of the web did not seem to react immediately, as if confused by the lack of movement within the web. It tapped the web with its front legs, and slowly made its way to the suspended sawfly about 5 cm away. After about 30 seconds it found the insect and embraced it with several of its legs as if to start spinning web around its prey victim. But instead of winding it round with thread, the *Araneus* extracted the sayfly from the web and dropped it onto the ground, 20 cm below. After a few seconds of wing-stretching and antenna-cleaning, the sawfly flew off apparently unharmed.

Spiders have chemosensitive hairs on their legs, enabling them to judge the nature, not just the presence, of their prey. In this case, the spider may have identified the insect in its web as an unsuitable or unpalatable object, and accordingly ejected it.— Richard A. Jones, 13 Bellwood Road, Nunhead, London SE15 3DE.

OBSERVATIONS ON INVERTEBRATES COLLECTED UP DURING WILD FLOWER SEED HARVESTING IN A HAY MEADOW, WITH PARTICULAR REFERENCE TO THE BUTTERFLIES AND MOTHS

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The forester moth, *Adscita statices* L., is a local moth in Oxfordshire and Buckinghamshire. One of its few remaining sites in these counties is the Bernwood Meadows nature reserve which is a traditional hay-meadow. The moth is fairly common here most years. Several former sites in the area have been destroyed by agricultural intensification. I was therefore concerned when I learned, in 1988, that Bernwood Meadows was to be harvested for wild flower seed on several occasions in June and July 1988 using a large vacuuming device. I was unable to find any information on the effects on butterflies and moths of such an operation so I arranged to follow the machine, make some observations and to find out more about this type of harvesting.

Dr C.W.D. Gibson had made some unpublished observations and recommendations based on observations made on 23.vii.87, the first year in which seed harvesting at Bernwood meadows took place. He has kindly given me permission to incorporate his notes.

THE INCENTIVE TO HARVEST WILDFLOWER SEED

Popular interest in growing wild flower seed took off in the late 1970s and early 1980s and a variety of machines have been designed to collect seed for this purpose. The machine in use at Bernwood Meadows was specially designed to harvest seed from North Meadow, Cricklade, without damaging it and it has been used there for several years. The amount and value of the seed harvest varies from year to year but can be £300 per acre in a reasonable year, at £20 per kg. This is as much as eight times the value of the hay crop per acre (P. Carey pers. comm.). This offers an additional revenue for site owners, for the hay can still be cut after the seed harvest. Seed from a nature reserve or site of special scientific interest can be promoted as such and may help sales. The revenue can be used to fund management work or monitoring studies on reserves so the option is being considered at a number of sites and this may increase as the demand continues.

THE SEED HARVESTING MACHINE

The machine (Figure 1) consists of six rectangular suction heads which are dragged over the sward. These are arranged in a line to give a 4 m swathe. They rest on little wheels and can be set at different heights just above the ground. They were set at 2.5 cm on my visit. The heads lead via tubes into a large drum in which is mounted a fan. The fan creates the suction and is powered directly off the PTO drive of the tractor which tows the machine across the field at about half normal walking speed. On this machine the suction heads are at the rear and the air drawn by the fan is blown out at the front and disturbs the sward. In other designs this arrangement may be reversed.

From the insects' and seeds' point of view the tractor wheels pass first, followed by a blast of air from the fan and then the lesser load of the wheels which support the drum. Lastly the sward is pushed over forwards, is scraped by the blunt blades of the

Fig. 1. Seed harvester in action.

suction heads and suction is applied to the sward mostly after it has been pushed over. Once the machine has passed, the sward springs up to a greater or lesser extent but does not return to the undisturbed condition, at least not on the same day, and this and the tyre tracks show which areas the machine has covered (Figure 2).

To collect the full variety of seed it is necessary for the machine to make several visits spread throughout late June and July (six visits in 1987). The sward must be dry to the touch before harvesting and sunny calm conditions are preferred.

Effects on the invertebrates

Both Dr Gibson and I concentrated on the invertebrates that were collected up by the machine on the day and were not able to investigate the longer-term effects of additional soil compaction and changes in the composition or structure of the vegetation that may or may not result from seed harvesting. Also, we were unable to sample the invertebrates that remained within the sward after the seed harvester had passed. Dr Gibson observed that the suction of the machine at normal power was low compared with standard insect vacuum samplers such as the 'D-vac' and Burkhard 'Univac'. On the basis of his experience with the D-vac he estimates that the catch of insects which he observed was equivalent to 1–3% of the likely fauna present in the area covered by the machine.

In 1988 the machine made three visits between July 15 and early August and I was present on the first of these. The operation was 3 weeks late due to bad weather and most of the buttercup seed was missed. The forester moth had finished flying a fortnight previously (A Saunders pers. comm.) and did not appear in the catch.

Composition of the catch

The catch of seeds and insects was not simply closed up and removed from the site for later sorting. The operator was in the habit of spreading the seed out on a sheet after every two or three swathes across the field, partly to allow the seed to dry and

Fig. 2. Hay sward after passage of harvester.

partly to rid it of as many of the invertebrates as could fly or crawl away. The seed was swept out of the floor of the drum with a brush. Apparently at least one frog and one mouse have been collected up by the machine in the past and both emerged unharmed during sweeping out! (P. Carey, pers. comm.). What emerges onto the sheet is a pile of seeds seething with invertebrates, the latter consisting mainly of insects and spiders. Hemiptera (bugs), Collembola (springtails) and the larvae of the Symphyta (sawflies) were present in very large numbers. Adult Diptera and Hymenoptera were well represented. The Coleoptera were mainly represented by cantharids (soldier beetles) and small curculionids (weevils). Orthoptera, both tettigonids (bush crickets) and acridids (grasshoppers), were present in small numbers, as were representatives of other orders such as the Mecoptera (scorpion flies) and Neuroptera (lace-wings). My particular interest was the Lepidoptera, (butterflies and moths) and these were counted individually. I also recorded bees. Paul Hatcher and Bob Brocklehurst assisted with the counting, which had to be done rapidly so as not to hold up the operation. The results are shown in Table 1.

Numbers of Lepidoptera

Bearing in mind that the Lepidoptera were collected from 1.6 hectares (4 acres) the numbers removed are relatively small. Most numerous among the adults was the meadow brown butterfly, *Maniola jurtina* L. at 63 individuals. The numbers of other butterfly species collected were much smaller (Table 1).

As a crude indication of the scale of removal of butterflies from the total in the meadows, the numbers of *M. jurtina* seen on three 90m × 4m transects across the width of the harvested areas as soon as the machine had left the site were 8, 18 and 23 (total 49) compared with similar transect counts adjacent to the area of 38, 11 and 18 (total 67). The high figure of 38 came from the border of the harvested area and could be due to temporary displacement of butterflies from it. Otherwise the transect counts in the two areas are little different, though the possibility exists that the butterflies were quick to move into the harvested area from elsewhere and restored

Table 1. The butterflies, larger moths, bumble bees and larvae of sawflies collected by a wild flower seed harvester from 1.6 hectares of the Bernwood Meadows, Bucks on 15 July 1988.

Butterflies		
Meadow brown	*Maniola jurtina*	63
Marbled white	*Melanargia galathea*	6
Small skipper	*Thymelicus sylvestris*	3
Large skipper	*Ochlodes venata*	2
Gatekeeper	*Pyronia tithonus*	1
Moths		
Narrow-bordered five-spot burnet	*Zygaena lonicerae*	6
Six-spot burnet	*Zygaena filipendulae*	3
Large yellow underwing	*Noctua pronuba*	3
Silver Y	*Autographa gamma*	1
Larvae		
Burnet campanion	*Euclidia glyphica*	43
Mother shipton	*Callistege mi*	
Apamea spp. probably rustic shoulder-knot and clouded-bordered brindle	*A. sordens* and *A. crenata*	several 100s
Pug moth larvae	*Eupithecia* spp	3
Common wainscot	*Mythimna pallens*	2
Burnished brass	*Diachrysia chrysitis*	2
Sawfly larvae	(Symphyta)	several 100s
Bumblebees		
Bombus spp. including *B. terrestris*, *B lucorum* *B. lapidarius* and others		106

any imbalance. The average densities of adult meadow browns seen in the harvested and unharvested transects are 0.045 and 0.062 adults per m^2. On this basis the estimated population in the harvested area was about 720 adults after harvesting and 783 before, assuming that the number of butterflies entering the harvested area was balanced by the number leaving. This gives a removal rate of 8% which is only approximate because some individuals on the transects may have been counted twice while others may have been overlooked in the grass. The counts in the unharvested transects give an estimated population in 1.6 hectares of 993 individuals, on which basis the removal of 63 represents 6% of the butterflies on the wing in the area at the time of harvest.

The only time that the meadow brown population in Bernwood Meadows has been studied fully throughout the year was by Clarke (1988) who counted the numbers of adults in random 1-m^2 quadrats during 1982. She recorded a peak density of 0.98 adults per m^2 on 29.vi.82 but numbers had declined to 0.35 adults per m^2 on 7.vii.82 and 0.24 adults per m^2 on 16.vii.82. Assuming a similar population size in 1988 and a similar flight period, the peak adult population in the 1.6 hectares covered by the seed harvester would have been 15 680 adults but this would have declined to 3840 adults by the time of the seed harvester's visit. The 63 adults that were collected by the harvester represents 1.6% of the theoretical population on the day and 0.4% of the peak population of the area harvested.

Butterfly populations are known to fluctuate from year to year. If the 1988 population of meadow browns in the meadow was lower than in 1982, the removal rates based on Clarke's data are under-estimates. In Bernwood Forest, adjacent to the meadows, butterfly populations are monitored using the Pollard transect walk

method (Pollard 1977). The totals indicate that 1988 was a poor year for meadow browns and that in 1982 nearly three times as many were seen as in 1988. Consequently the actual removal rates in the meadows *might* be nearly three times as high as those given above and about 5% of the adult population of the harvested area on the day. The latter is of the same order as that estimated from the transect walks through the area.

The impact of repeated visits depends on the proportion of the population on the wing at each visit. For six visits (as in 1987) the maximum impact would occur if the whole population was on the wing simultaneously on all six occasions. This would result in about 26% removal in total if 5% were removed each visit. If the population was composed of completely different individuals on each occasion the removal rate would be a maximum of 5%. Clarke (1988) found that males emerged in advance of females and that some individuals of both sexes lived more than 10 days, which is long enough for them to encounter multiple visits of the harvester, so the actual removal rate will be somewhere between the two limits above. The pattern of emergence and the incidence of seed harvesting are likely to vary from year to year, contributing another source of variation. Clarke's results show that the population changes greatly from week to week building to a peak and then declining. With at least a week between harvesting visits only one visit is likely to coincide with the peak population density. The population on a single day at the peak of the flight season might only be a third of the total emergence for the year, based on studies of other grassland butterflies (Thomas 1983). On this basis three visits spread throughout the season, each removing 5% of the butterflies on the day, would result in removal of less than 5% of the total population.

A large population of a common insect such as the meadow brown can survive the maximum harvesting rates given above but annual removals at maximum levels would probably result in a lowering of abundance. The survival of species with smaller populations or with individuals that are more vulnerable than the meadow brown is to the seed harvester could be jeopardized by intensive seed harvesting however.

During the harvesting it was noticeable that many butterflies flew out of the way of the machine before the suction heads arrived. This was greatly assisted by the fact that the blow-out from the fan is 1.5 m in advance of the suction heads. The expelled air rustles the grass and provides the butterflies with an early warning to move. This would not be the case if the suction heads preceeded the blow-out, in which case catches might be higher of insects that presently heed the early warning of the blow-out and fly off.

Burnet moths (Zygaenidae) were less inclined to move and the catch may be a higher proportion of the total population but no estimate of the population is available. None were seen on any of the transect walks, probably because they were resting among the sward. As the burnet moths are similar in shape, size and behaviour to the forester, it is likely that some of these would also have been removed by the harvester had it started on schedule 3 weeks previously.

The weather will affect the tendency of adult Lepidoptera to move off in advance of the machine. On my visit the weather was rather cool and dull until early afternoon and insects were possibly more sluggish than on hot days.

In mid-July most of the abundant moths in the meadow are in the pupal or adult stages. These are principally nocturnal moths and light trap catches reach a peak in late July. These are listed in Waring (1988). The surprise was that only four adult nocturnal moths were collected by the seed harvester. Three were *Noctua pronuba* L., which has a habit of flying up from the grass during the day if disturbed, and the

other was a silver Y, *Autographa gamma* L., which is active by day and by night. Some possible reasons for the small numbers of nocturnal moths collected by the harvester are as follows.

1. Few moths had emerged from pupae by July 15. This is unlikely as experience on nearby sites and in other years shows that numbers are already building up in early July.

2. The moths are emerging but they are roosting elsewhere, in hedgerows and the adjacent wood. Moths can move considerable distances from open ground to local woods (eg Waring 1984) but there is no evidence that a mass translocation takes place each day and other meadows far from cover are known to produce large catches of moths at nightfall.

3. It is most likely that the moths are resting low down in the sward and probably head lower still when disturbed by the seed-harvester. If this is the case they will be trapped and held among the bent over grass stems as the harvester passes over. Only a species like *N. pronuba* which flies up quickly, or moths resting on flowers, like the burnets, will be amongst the seedheads when the harvester inlets scrape over them and draw off loose material. Other moths were not seen flying up in advance of the harvester. What happens to moths among the sward when the harvester passes over them is unknown but it would be easy to estimate the survival rate by placing a few specimens in this situation experimentally. Searches for roosting and damaged moths could be made in quadrats within the sward. Less direct would be comparison of light trap catches on the night before and the night after each harvesting visit. This would be worthwhile to see if there is consistently a decline in numbers after each harvesting visit though stable weather conditions would be needed for these can influence the catch greatly.

The larval stages of the Lepidoptera were collected by the seed harvester in larger quantities and could be counted in hundreds. The majority of these larvae were early instars of one or more noctuid species of the genus *Apamea* (G. Haggett pers. comm.). Most likely they were the rustic shoulder-knot, *Apamea sordens* Hufn., which feeds on developing grass seeds in July and can be swept from grass heads in large numbers. The clouded-bordered brindle *Apamea crenata* Hufn. is another possibility. The date was too early for the young larvae of most other *Apamea* species (Newman & Leeds 1913).

Forty-three of the lepidopterous larvae were young specimens of either the burnet companion, *Euclidia glyphica* L., or the mother shipton, *Callistege mi* Cl. Both species occur in these meadows and the larvae are very similar in appearance and in the timing of the lifecycle.

A. sordens, *A. crenata*, *E. glyphica* and *C. mi* are regularly seen as adults in the meadows, by day in the case of the latter two species. The small range of species of larvae in spite of the large number of specimens collected is partly a reflection of the time of year and the relative abundance of different species but it also suggests that some species are more vulnerable than others. The other common species with larvae that are present at this time are the small square-spot, *Diarsia rubi* View., and treble lines, *Charanyca trigrammica* Hufn., which forages low down on plantains and other herbaceous plants and the small wainscot, *Photedes pygmina* Haw. which feeds in the stems of grasses. These habits explain why they were not seen in the samples.

The larvae of *A. sordens* feed in the grassheads and the larvae of *E. glyphica* and *C. mi* like to rest stretched out along stems and must be some distance from the ground for they are easily swept with a net. Larvae that feed low down or drop as soon as they are disturbed will be trapped amongst grass stems and will not be extracted very readily by the seed-harvester.

Damage to and removal of invertebrates passing through the seed harvester

The practice of spreading the seed out on a sheet to dry on site during the harvesting process allows some undamaged invertebrates to escape and this is an advantage to the operator for it rids the seed crop of some 'impurities'. Bumblebees (*Bombus* spp.) appeared to be largely undamaged and although 106 of these valued pollinators were collected during the operation, most of these had flown off by the end of the afternoon. Butterflies passing through the harvester were generally damaged in the process and of the total sample shown in Table 1, 60% were unable to fly away afterwards. Grasshoppers (Acrididae) frequently lost hind legs and the larger slender mirid bugs also lost parts of their anatomy but few of the insects were squashed or minced by the harvester, so the samples were useful to the entomologist wishing to identify them. The vast majority of the smaller insects and most of the larvae were still present amongst the seed when it was removed from the site at the end of the day. Those that had crawled to the edge of the sheet were probably more vulnerable to predators because of the concentration of numbers in this spot and they may also be unable to find the appropriate species of food-plant to survive.

Conclusions

Large numbers of insects are collected during the harvesting of wild flower seed and most of these are unlikely to complete their life-cycle once they enter the harvester, either because of damage sustained or because they are subsequently removed from site with the seed. Bumblebees are an exception and are usually at least able to fly away after passing through the machine.

The large numbers of insects harvested need to be seen in the context of the populations present in the fields and the fact that many of these meadows are traditionally harvested for hay a little later during the summer, with dramatic effects on the flora and fauna.

For one species, the butterfly, the meadow brown, the approximate likely population size is known. The number of adults removed by the harvester on a single visit was probably somewhat less than 10% of the total population on the day and would be a much smaller fraction of the total adult population for the year in the area harvested even if the visit had taken place at peak season. Meadow browns and other species of butterfly respond to the advance warning provided by the blow out from the harvester and fly out of the way, thus reducing the number that are collected.

Rough estimates provided by Dr C.W.D. Gibson on the basis of his experience with D-vac samplers, suggest that for the Hemiptera as a group between 1 and 3% of the total number present are removed by the harvester.

From the composition of the catch it appears that, not surprising, insects which feed on or rest on flower and seedheads or high up on the stems are more vulnerable than those lower down and for the former the percentage removal could be higher than that given above. The forester moth, *A. statices*, a nationally notable insect, is in this vulnerable category. Because of delays in 1988 seed-harvesting took place after the moth had finished its flying season but the closely related burnet moths (2 spp.) were the second most numerous group of adult Lepidoptera in the harvester even though the total population sizes (unknown) are probably smaller, on the basis of adults seen during the year, than for butterflies such as the marbled white and large and small skippers which were also 'harvested'.

Other moths likely to be particularly vulnerable to seed harvesting (Table 2) are

Table 2. List of macro-moth species that could be particularly at risk during seed-harvesting operations on neutral or calcareous herb-rich grasslands, with notes on the most vulnerable stage.

Black-neck, *Lygephila pastinum*, larva—late July to May on tufted vetch (*Vicia cracca*).

Broad-barred white, *Hecatera bicolorata*, larva—late July to September on buds and flowers of hawkweed (*Hieracium* spp.) and hawk's beard (*Crepis* spp.).

Burnet companion, *Euclidia glyphica*, larva—July and August on various clovers and trefoils (*Trifolium* spp. and *Lotus* spp.).

Chalk carpet, *Scotopteryx bipunctaria*, larva—in June on clovers and trefoils. Adult flies up by day in July and August.

Chimney-sweeper, *Odezia atrata*, adult—June and July. Fly during sunny periods. Dependent on pignut (*Conopodium majus*).

Cistus forester, *Adscita geryon*, adult—June and July on flower-heads. Dependent on rockrose (*Helianthemum* spp.).

Five-spot burnet, *Zygaena trifolii*, adult—on flower heads subsp. *Z.t. decreta* July to August, dependent on *Lotus uliginosus*. Subsp. *Z.t. palustrella* May and June dependent on *Lotus corniculatus*.

Forester, *Adscita statices*, adult—June and July on flower-heads. Larva dependent on sorrels, (*Rumex* spp.).

Four-spotted, *Tyta luctuosa*, larva—June to September on field bindweed (*Convolvulus arvensis*). Adult May/June and July/August. Two generations on some sites. Sometimes active by day.

Grass rivulet, *Perizoma albulata*, larva—July and August, feeds on ripening seeds of yellow rattle (*Rhinanthus minor*) which may be depleted by seed-harvesting.

Marbled clover, *Heliothis viriplaca*, larva—August and September on wide variety of flowers and seeds.

Mother shipton, *Callistege mi*, larva—July to September. Either legumes or grasses.

Narrow-bordered five-spot burnet, *Zygaena lonicerae*, adult—late June and July on flower heads. Dependent on legumes.

Scarce forester, *Adscita globulariae*, adult—June on flower heads. Dependent on knapweeds (*Centaurea* spp.).

Shaded pug, *Eupithecia subumbrata*, larva—July to September on a wide variety of flowers.

Small yellow underwing, *Panemeria tenebrata*, larva—June and July on seed capsules of mouse-ears (*Cerastium* spp.).

Straw belle, *Aspitates gilvaria*, adult—July and August. Flies up weakly if disturbed. Local to Surrey, Kent and Ireland.

the grass rivulet. *Perizoma albulata* D.&S. and the small yellow underwing, *Panemeria tenebrata* Scop., the caterpillars of which feed on the ripening seeds of yellow rattle, *Rhinanthus minor* L. and the mouse-ears, *Cerastium* spp. respectively.

All of these insects survive the traditional hay cut which takes place most years between late June and August depending on weather conditions, growth and the wetness of the ground. It is certain that the insects will survive a single harvest of flower seed at this time, using a machine like the one at Bernwood, for this has much less impact than the haycut. However, the impact of multiple visits at different times of the year to get the full variety of seeds is unknown. Six visits were made to part of Brenwood Meadows in 1987 and three in 1988.

Recommendations

The above observations are based on one day watching a flower seed harvester in action and on a general familiarity with the butterfly and moth fauna of the site. My first recommendation would be that more observations are made and published. What are most needed are reliable measures of actual population sizes of particular

insects against which the numbers collected by the seed harvester can be compared, followed by long-term monitoring of sites on which seed harvesting is taking place to see if there is evidence of a decline in the species of interest. In the absence of such data Dr Gibson and I recommend the following:

For entomologists

1. Preparation of a list of those invertebrate species that are likely to be especially vulnerable to seed harvesting in hay meadows. For the macrolepidoptera I would suggest that the species shown in Table 2 are included.
2. Continue to record and report the invertebrates of most interest in your local hay meadow sites. If you have the opportunity, follow a seed harvester to see what it collects. The problem here is that the harvest is weather dependent and the decision on when to harvest is often taken at short notice, such as the morning of the day in question.
3. Monitor the numbers of particularly vulnerable species from year to year. Some of the moths in Table 2 can be counted by day.

For the conservation organizations

1. Find out if any nationally uncommon or vulnerable species have been recorded from each proposed seed harvesting site. The site manager and any colleagues and recorders, the local and national biological records centres, any local entomologists known to visit the site and the Invertebrate Site Register of the Nature Conservancy Council should be contacted in that order. If the meadow falls within a site of special scientific interest NCC must be consulted before seed harvesting proceeds and these checks will be made. If there is no invertebrate information see if a selective survey for vulnerable species can be organized. This may be needed in any case to find out exactly where on the site any vulnerable species occur.
2. If there are particularly vulnerable species on the site and if these are localized to certain parts, cordon these off and do not harvest them for seed. If the species are nationally rare and are found over the whole site seed harvesting should not take place until the results of proper studies are available. Other sites can be found to harvest.
3. At this stage I recommend that only part of each site is harvested in any year. Further I would recommend that the seed harvest is confined to the same part each year. If seed harvesting has no effect on the flora and fauna there is no need to harvest on a rotational basis. If there are effects it will be easier to see what these effects are using this system, and the rest of the site will have been spared.
4. No-one can really say what proportion of the field should be seed harvested each year. Figures of one-fourth or less have been suggested. If the site is heterogenous harvesting in strips rather than in a single localized block is better from two points of view. Firstly the seed mix will be more varied and secondly any localized habitat features are less likely to be completely harvested. One advantage of harvesting the same ground every year is that the strips can be marked out permanently. Remarking sites every year on rotation and between passes in the same year will not only be time consuming but it will also make the study of any long-term effects extremely difficult.

Points for the operator

1. The design of this machine with the blow-out in advance of the suction heads gives insects advance warning and butterflies especially fly out of the way at this point.
2. Spreading out the seed on a sheet after each traverse of the field rids the seed of many insects which can fly off. This operation is valuable for bumblebees, the majority of which are apparently undamaged and able to fly away. However, the seed still contains large numbers of insects after several hours of exposure and requires offsite separation of seeds from dead or dying insects. Local entomologists may be interested in the insect material at this stage.
3. In most cases the operator will be the only person on site during seed harvesting and any observations he or she can make on the numbers of butterflies, moths or other large insects left amongst the seed at the end of the day would be much appreciated.

At Bernwood Meadows the above recommendations have been followed with the exception that in 1987 rotational seed harvesting of a single block was recommended and in accordance a different area has been harvested in each of the 3 years. The proportion seed harvested each year has been 22% (1.6 hectares).

The distribution of the forester moth and the host plant of the small yellow underwing have been mapped (Waring, Saunders, Glossler unpublished). So far the seed harvest has not included the area where most foresters are seen, which is also the site of the only record of their larvae from the meadow. This small corner will be left out of the 4-year rotation.

To date none of the vulnerable species of macro-moth have been lost from the meadows and some have been seen in areas previously seed-harvested though no further quantitative studies have been done.

Acknowledgements

I would like to thank Mr and Mrs Peter Carey for their co-operation during the harvesting of the seed, Dr Paul Hatcher and Bob Brocklehurst for help in counting the insects, Dr C.W.D. Gibson for his observations from 1987, Dr Susan Clarke for information on the likely population sizes of butterflies in the meadow, Jack Hulbert for the data from the Bernwood Forest butterfly transect walk, Mr Arthur Saunders and Mrs Caroline Gossler for their observations on the forester moth and the distribution of *Cerastium* and Dr Rachel Thomas, former Buckinghamshire County Officer of the Berkshire, Buckinghamshire and Oxfordshire Naturalists' Trust, for inviting me to observe wideflower seed-harvesting in action.

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Corrections — R.G. Warren's exhibit on 28 October 1989 (*Br. J. Ent. Nat. Hist.* 1990: **3:** 74), the following corrections should be noted: (1) *Anacampsis temerella* Zell. was shown to be a very dark form of *Monochroa lucidella* Steph. (gen. det. E.S. Bradford), quite unlike the other example of that species exhibited, also from Crymlyn Bog. (2) *Ypsolopha lucella* F. should be *Y. alpella* D. & S. (det. D.J.L. Agassiz).

THE GEOGRAPHICAL DISTRIBUTIONS OF LADYBIRDS IN BRITAIN (1984–1989)

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Few insects are regarded with such general favour as ladybirds. Yet these insects have rarely been submitted to close scientific scrutiny in Britain. Although a Coccinellidae Distribution Mapping Scheme, run by the Natural Environment Research Council Biological Records' Centre, has been in operation for some time, it has not, as yet, published any distribution maps. When it does, the maps will contain all British records, including many over a century old (Muggleton, pers. comm.). Gaining a full appreciation of current distributions from such maps is not always easy. In an attempt to obtain a contemporary view of ladybird distributions in Britain, a nationwide survey of ladybirds was initiated in 1984. The intention of the survey was, and is, to collect information on all aspects of ladybird biology, including their British distributions. The survey was advertised through national and regional press, radio and television, through entomological journals and at entomological exhibitions. Since 1984, we have built up a formidable team of regular ladybird recorders, and have had one or more records from over 7000 people. A diverse range of people have become involved in the survey, from children who have had no formal biological training, to experienced professional entomologists, and with an age range from 3 to 96.

In this paper we present the results of the first 5 years of the survey, outlining some of the suspected biases in the data and the safeguards used to minimize any inaccuracies that may have resulted from the inexperience of some of the recorders.

HOW THE SURVEY HAS BEEN CONDUCTED

In October 1984 an exhibit was displayed at the Amateur Entomologists' Exhibition, on some of the genetical and evolutionary work on ladybirds that M. Majerus had been conducting with colleagues at Cambridge. The last part of the display was a request for information on various aspects of ladybird biology, including their geographical distributions. That request gave rise to the Cambridge Ladybird Survey.

Because of the general dearth of easily available literature on ladybirds in Britain, it was obvious from the outset that we would obtain more valuable information if we gave potential recorders some guidance and feedback. Consequently, we have, over the 5 years of the survey, produced a number of leaflets for recorders. These have included ladybird fact sheets, notes for identification, lists of project ideas and two identification charts with accompanying notes. The first of the charts was illustrated by one of our technicians, Heather Ireland and published by us. The second was illustrated by a professional artist, Sophie Allington, and published by Richmond Publishing. In addition we have produced a Ladybird Newsletter twice a year to keep recorders informed of the survey's progress, and to request data of specific types.

Ladybirds seemed to be amenable as material for a survey to be conducted by persons of a wide range of experience and ability for three principal reasons: (i) they are generally popular, (ii) they are brightly coloured and often rest in exposed positions so that they are easy to find during the day without expensive equipment, (iii) most are easy to identify. It should be pointed out that of the 42 species belonging

to the beetle family Coccinellidae, some are very small (less than 3 mm in length) and are black or brown without bright spotting. Some of these, particularly those belonging to the genera *Nephus* and *Scymnus*, are not easy to identify. Consequently, it was decided that the survey would be confined to the 24 coccinellid species that we, perhaps rather subjectively, decided were 'ladybirds'. The intention was that anyone should be able to take part in the survey. For four pairs of species over which some confusion in identity might still arise, single easily visible diagnostic characters were provided. So, for example the 2-spot ladybird (*Adalia 2-punctata*) and the 10-spot ladybird (*Adalia 10-punctata*) can be separated on leg colour, the former having black and the latter brown legs. It was stressed, from the outset, that if a recorder was in any doubt over the identity of a ladybird they should send it to us, preferably alive. Instructions for sending ladybirds through the post were provided. In the latter part of the survey, an identification key to ladybirds, designed for use in the field by inexperienced recorders, has been available (Majerus & Kearns, 1989).

Throughout the survey we have asked recorders to provide information on host plants, habitats, ladybird behaviour and morph frequencies for variable species, in addition to species, date and location data. The intention was primarily to obtain more information on the habits and ecology of ladybirds. However, this information has also been useful in helping us to pick out possible errors in identification. In any instance in which a report seemed unusual in some particular, the recorder was asked to confirm the record, and if possible to send a specimen. To give two examples; when we received a record of several 'pine ladybirds' (*Exochomus 4-pustulatus*) being found near Manchester, on apple trees in 1985, together with typical 2-spot ladybirds (*Adalia 2-punctata*), I suspected that the 'pine ladybirds' might be the melanic form f. *quadrimaculata*, of the 2-spot. A letter to the recorder, pointing out the difference in shape and spot positioning of the two, bought a specimen and a reply confirming my suspicion. In another case, we suspected a putative larch ladybird (*Aphidecta obliterata*), found on heather, might have been a lightly marked hieroglyphic ladybird (*Coccinella hieroglyphica*). However, the recorder confirmed his original identification, and pointed out that there was substantial conifer plantation in close proximity to the location where the ladybird was found.

In some cases, an apparently bona fide report is so out of the ordinary, generally because a species has been found well outside its known distribution, or because an exceptionally large number of ladybirds is involved, that we feel a visit to the location is warranted. It is a testimony to the ability of our recorders, that, in every such case, the report received initially has been correct in every important detail.

The distribution maps are based on the 10–km square national grid system. We were aware that many of our potential recorders would not have experience in reading map references. We therefore gave details of how map references should be taken. In addition, a verbal description of geographical location was requested. In the majority of cases, records of ladybirds have included both types of location information. In all cases, the two are cross-checked for consistency. In the very small number of cases where the map reference given does not agree with the verbal location given, we have written to the recorders seeking further information to clarify the matter.

We must stress that in any case where there has been any doubt about the correct identity of a ladybird, or an accurate map reference, the record has been discarded and has not been placed on the distribution maps.

Ladybird distributions

Maps 1–23 give the known distributions of 23 british ladybirds. The 13-spot ladybird (*Hippodamia 13-punctata*) has not been recorded during our survey. All of the records represented on the maps are from observations made between 1.iv.84 and 31.xii.89, and received by the Cambridge Ladybird Survey by the latter date.

We are aware that none of the maps represents a complete picture of a species' present geographical distribution. There are biases due to the number of recorders living in different regions, and to the variation in the ability of recorders to find some of the smaller, more secretive, or more habitat-specific species. Undoubtedly many 10-km squares, particularly in areas where few people live, such as highland regions and some of the off-shore islands, have never been visited by our recorders. Despite these shortcomings, some conclusions can be drawn from the distribution maps, even at this stage. These are given below for each species, together with notes on suspected biases in the distribution maps, and reasons for these biases.

Subcoccinella 24-punctata L. (24-spot ladybird) Map 1. Widely distributed and often common in lowland parts of southern England, East Anglia, and south and west Wales. Scarce in the midlands and further north. A small species that will often be missed if not sought by examining low growing plants carefully by eye or with a sweepnet. Probably under-recorded in the midlands, Avon and around the Thames estuary.

Hippodamia 13-punctata L. (13-spot ladybird) No map. No records. Probably extinct. It is our belief that this species will again be recorded in Britain. The majority of past records of this species are from eastern counties (Majerus, in prep. a). We suspect that intermittently small numbers of this species, possibly including some gravid females, migrate to Britain from the continent. When they arrive, they establish colonies that persist for a period of a few years before dying out, probably because of the inclemancy of our climate. It is possible that as our climate changes due to the effects of atmospheric pollution ('the greenhouse effect') this species may become established as a permanent resident.

Adonia variegata Goeze (Adonis ladybird) Map 2. A scarce and local species, known to be well established in three regions (London and Surrey, southern Wales and Staffordshire), with a few other scattered records generally of only one or a few individuals. Absent from Scotland. Possibly under-recorded due to its local nature, however, there is no reason why it should have been recorded less than other species, such as the 11-spot ladybird (Map 10), which is similar in size and may be sought in the same way, unless it really is much more local and scarce.

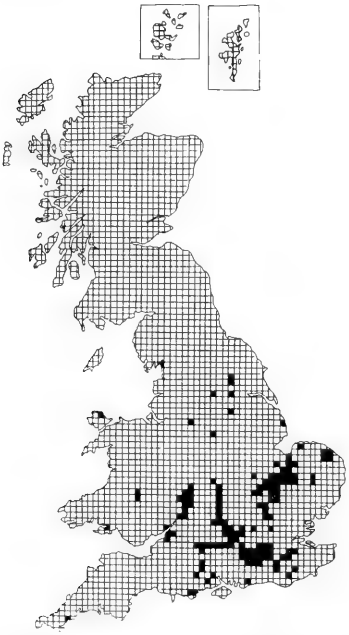
Anisosticta 19-punctata L. (water ladybird) Map 3. Widely distributed and often common (in appropriate habitats, ie reed beds) in southern, eastern and central England. Scarce in the west. Absent from Scotland. As this species is so habitat-specific, rarely being found away from reed-mace (*Typha*) or reed (*Phragmites*) beds, it will be missed unless such habitats are specifically examined. We suspect it is underrecorded in Essex, Kent, Suffolk and Hertfordshire, and the same may be true of other parts of south and central England.

Aphidecta obliterata (larch ladybird) Map 4. Widely distributed and often common or abundant in appropriate habitats (conifer woodland). Distribution of recorders bias in England and Wales. Probably very much more widespread in Scotland than shown.

Micraspis 16-punctata L. (16-spot ladybird) Map 5. Widely distributed and often common in southern and eastern England. Becoming rarer to the north and west. Scarce in Wales. Absent from Scotland. A small meadowland species which is easily missed unless sought by sweeping.

Map 1. 24 spot ladybird *Subcoccinella 24-puntata*

Map 2. Adonis' ladybird *Adonia variegata*



Map 3. Water ladybird *Anisosticta 19-punctata*

Map 4. Larch ladybird *Aphidecta obliterata*

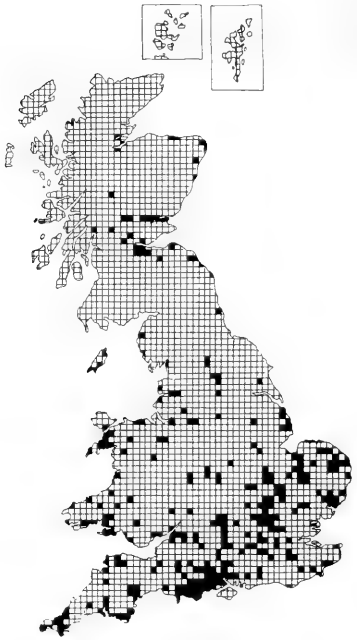
Map 5. 16 spot ladybird *Micraspis 16-punctata*

Map 6. 2 spot ladybird *Adalia 2-punctata*

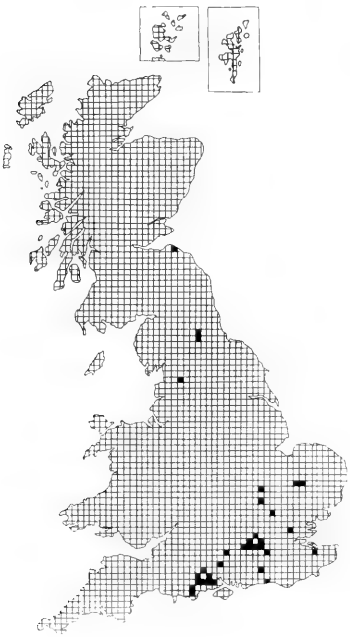
Map 7. 10 spot ladybird *Adalia 10-punctata*

Map 8. 7 spot ladybird *Coccinella 7-punctata*

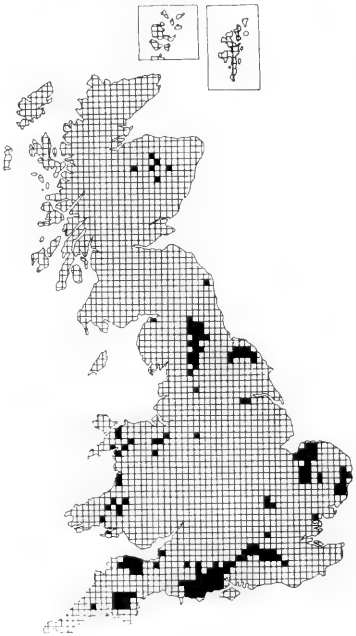
Map 9. 5 spot ladybird *Coccinella 5-punctata*



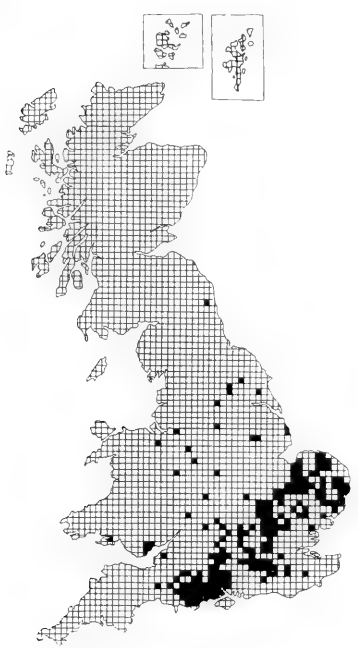
Map 10. 11 spot ladybird *Coccinella 11-punctata*



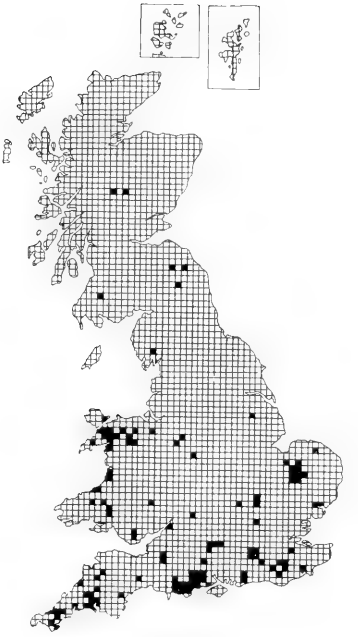
Map 11. Scarce 7 spot ladybird *Coccinella magnifica*



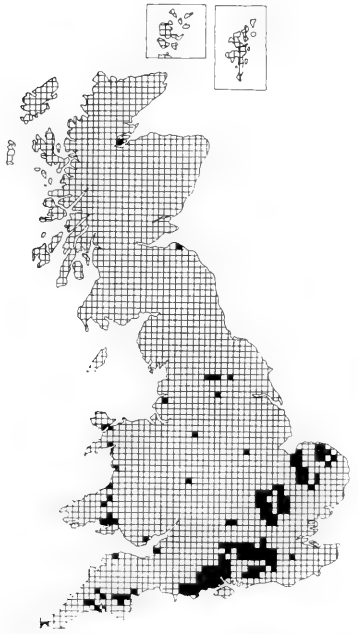
Map 12. Hieroglyphic ladybird *Coccinella hieroglyphica*



Map 13. Cream-streaked ladybird *Harmonia 4-punctata*



Map 14. Orange ladybird *Halyzia 16-guttata*

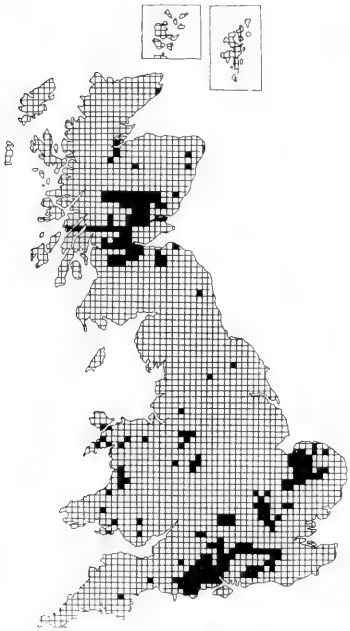


Map 15. 18 spot ladybird *Myrrha 18-guttata*

Map 16. 22 spot ladybird *Psyllobora 22-punctata*

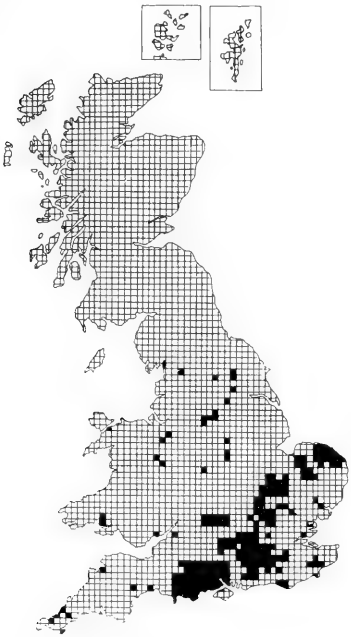
Map 17. Cream-spot ladybird *Calvia 14-guttata*

Map 18. 14 spot ladybird *Propylea 14-punctata*

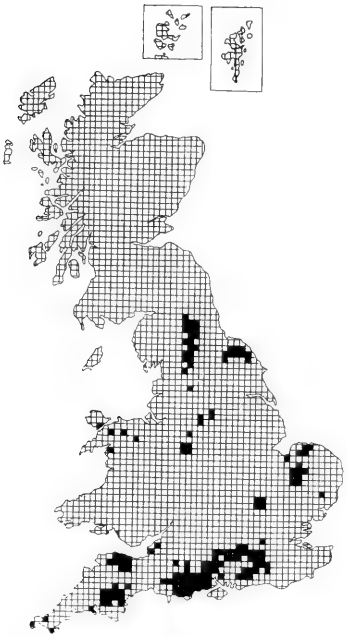


Map 19. Striped ladybird *Myzia oblongoguttata*

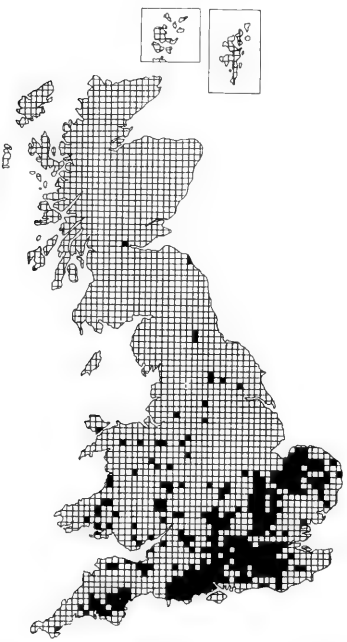
Map 20. Eyed ladybird *Anatis ocellata*



Map 21. Kidney-spot ladybird *Chilocorus renipulstulatus*



Map 22. Heather ladybird *Chilocorus 2-pustulatus*



Map 23. Pine ladybird *Exochomus 4-pustulatus*

Adalia 2-punctata L. (2-spot ladybird) Map 6. Widespread and often abundant, except at high altitude. Some distribution of recorders bias.

Adalia 10-punctata L. (10-spot ladybird) Map 7. Widespread and often abundant, except possibly at high altitude. Some distribution of recorders bias.

Coccinella 7-punctata L. (7-spot ladybird) Map 8. Widespread and abundant. Some distribution of recorders bias. NOTE: This map may be useful as a bench-mark of distribution of recorders bias, for we suspect the 7-spot ladybird occurs in virtually every 10-km square in Britain. Consequently, large gaps in the distribution map for this species may be taken as an indication of areas where we have few, or no, regular recorders.

Coccinella 5-punctata L. (5-spot ladybird) Map 9. Rare with a markedly disjunct distribution. Well established in suitable habitats in west Wales. Otherwise, also established in the Spey Valley in Scotland. The record in the midlands has been verified and probably represents a vagrant (Majerus, in press, a). The status of the Cornish record (a single individual) is not known. Due to the specialized nature of its preferred habit (unstable river shingles) (see Majerus & Fowles, 1989) appropriate sites for this species in Britain are often inaccessible. It is possible that the species occurs in other places where such habitats occur, particularly in western England and in Scotland.

Coccinella 11-punctata L. (11-spot ladybird) Map 10. Widely distributed and sometimes common, particularly on, or near, coasts. Strong distribution of recorders bias in inland areas.

Coccinella magnifica Redt. (scarce 7-spot ladybird) Map 11. Principally found in the south-east of England with a small number of records from further north. Generally very local, but not uncommon where it occurs. Due to its similarity to the 7-spot ladybird this species may be frequently overlooked. Further, because it often occurs in very small localized areas around nests of the wood ant, *Formica rufa* L., the number of 10-km squares where it occurs may be greatly underestimated (Majerus, 1989).

Coccinella hieroglyphica L. (hieroglyphic ladybird) Map 12. A disjunct distribution which follows areas where large expanses of *Calluna* and *Erica* heatherland occur. Population sizes vary greatly from year to year. Probably greatly under-recorded in Scotland, central Wales, and possibly the Pennines. It is best sought by sweeping heather.

Harmonia 4-punctata Pont. (cream-streaked ladybird) Map 13. Widely distributed in south-east England and East Anglia where conifers occur. Becoming scarcer and rather local to the north and west. Rather scarce in Wales and very rare in Scotland. An immigrant species which is still spreading from its original immigration point in East Anglia (see Hammond, 1974). May be as yet undetected in many areas on the edge of its range which we suspect will continue to expand to the north and west.

Halyzia 16-guttata L. (orange ladybird) Map 14. Widespread and sometimes common, particularly in southern England and west Wales. The species was once thought to be an indicator of relict ancient deciduous woodland, and rather scarce. However, since it was discovered, in 1987, to have a strong preference for sycamore (see Majerus & Williams, 1989), the number of records of this species has increased dramatically. We suspect the species is still severely under-recorded, but expect this situation to improve over the next 5 years, now that its preferred host tree is known.

Myrrha 18-guttata L. (18-spot ladybird) Map 15. Widespread and not uncommon in southern England, East Anglia and west Wales. Its distribution elsewhere is uncertain. We suspect that there is a very strong collector bias in respect of this species. A Scots pine specialist, this species is very difficult to find by eye, due to its

semi-cryptic markings. It must therefore be beaten for. Its preference for living in the crowns of old mature Scots pines also makes it difficult to find (see Majerus, 1988). The fact that over 90% of our records for this species have come from our own research team in Cambridge, or from other experienced entomologists, is perhaps an indication that some experience is needed in finding this ladybird. We suspect that it occurs in appropriate areas over much of England and Wales. We would not wish to guess at its status in Scotland.

Psyllobora 22-punctata L. (22-spot ladybird) Map 16. Widespread and sometimes common in south and central England and in Wales. Becoming rarer to the north with few records from Scotland. Some distribution of recorders bias.

Calvia 14-guttata L. (cream-spot ladybird) Map 17. Generally distributed over the British Isles. Some distribution of recorders bias.

Propylea 14-punctata L. (14-spot ladybird) Map 18. Generally distributed and often common over England, Wales and southern Scotland. Rare or absent in the Highlands and north-west of Scotland. Some distribution of recorders bias. We suspect it is severely under recorded in the midlands and the north of England.

Myzia oblongoguttata L. (striped ladybird) Map 19. Widely distributed across Britain where its preferred habitat occurs (mature Scots pine). Probably under-recorded in many parts of the country, and in particular in central Wales, the Lake District, and in pine plantations in the north of England and Scotland.

Anatis ocellata L. (eyed ladybird) Map 20. Widely distributed and often common in appropriate habitats (Scots pine) across Britain. Some distribution of recorders bias.

Chilocorus renipustulatus Rossi (kidney-spot ladybird) Map 21. Widely distributed and locally abundant in south and central England, becoming scarce in Wales and northern England. Absent from Scotland. Strong distribution of recorders bias in southern England.

Chilocorus 2-pustulatus L. (heather ladybird) Map 22. Disjunct distribution in England, where it is found principally on extensive areas of heather moorland and heathland. Scarce in Wales. Absent from Scotland. Probably severely under-recorded in Wales, and possibly on the moorlands of Yorkshire, the Pennines and the Lake District. Most easily found by sweeping heather.

Exochomus 4-pustulatus L. (pine ladybird) Map 23. Generally distributed and sometimes abundant in southern England, East Anglia and Wales. Becoming scarcer to the north. Rare in Scotland. Some distribution of recorders bias in the southern half of Britain.

Criticisms of the survey and its future

The above notes indicate that for many species the precise distributions depend crucially on habitat or host plant preferences. From notes sent in by recorders, and from our own observations we have compiled an extensive dossier on these preferences. This will be the subject of a separate paper (Majerus, in press, b).

The Cambridge Ladybird Survey is to continue until September 1994. It is perhaps pertinent to note that the survey has been criticized on two points. Firstly, data provided by inexperienced recorders is likely to be unreliable. Secondly, that no attempt was made to obtain an even spread of recorders with equal time available and of equal ability so that biases in distributions would be inevitable.

We accept the latter criticism, and have recently made attempts to increase the number of recorders we have in some of the less well covered areas. So, for example, in a recent interview with Charles Kennedy on BBC Radio Scotland we appealed for

help from interested persons, particularly those living in the Highlands and Southern Uplands. Further, we have written articles about the survey for various natural history societies, the most recent being one for the *North-West Naturalist*, which will hopefully attract more recorders from the Lake District and adjacent parts of the North-West of England. Approaches are also being made to wardens of nature and bird reserves on off-shore islands, and we are attempting now to include Ireland in the survey.

With regard to the first criticism, that data provided by inexperienced recorders is likely to be unreliable, we understand the criticism, but feel that the rewards that have accrued from encouraging all and sundry to take part, far outweigh the possibility that some data might be incorrect. We have already described the ways in which we have attempted to ensure data integrity, and we believe that the vast majority of the five and a half million records are bona fide. In addition, it is perhaps worth pointing out some of the pluses that have resulted from opening the survey to all comers. Firstly, the number of experienced recorders we have would be considerably less if we had tried to restrict the survey to experienced biologists or entomologists. Most of our recorders have heard of our work from our appearances on television, radio and in the national and local press. We feel it highly unlikely that the media would have been so willing to cover and publicize the survey if those invited to take part in it had to have relevant experience. For example, we do not believe that programs such as 'Saturday Superstore', 'The Wide Awake Club', 'John Craven's Newsround', 'Bellamy's Bugle', 'Wild Track', 'Caterpillar Trail', 'The BBC 1 9 O'clock News' or Radio 4's 'Today Programme' would have given us air time if a biology degree or membership of an entomological society had been a necessary qualification to take part in the survey.

Secondly, we felt that the subjects of the survey and the nature of the material we were seeking did not necessitate any great level of experience amongst recorders. Indeed, the survey was tailored to less experienced recorders almost from its conception, as evidenced by the fact that we restricted it to the 24 larger, more easily identified British coccinellids, and that we invented English names for those species previously lacking them so that younger recorders did not have to try to cope with latin binomials.

Thirdly, by including inexperienced recorders who had no preconceived notions of where to look and which types of habitats or which species of plant to search for ladybirds, we have gained a great deal of information which might have eluded experienced entomologists who did 'know' where to look. To give one spectacular example, in 1987 a young girl found orange ladybirds on sycamore, a tree which entomologists 'know' has a relatively poor insect flora. The follow-up to the initial record led to the confirmation that this tree is the most usual host-plant of this ladybird. Subsequently we found the early stages of the species for the first time, and the ensuing dissemination of this information to our recorders has led to a tremendous increase in reports of this ladybird during 1988 and 1989.

Finally, we feel that the involvement in the survey of many people who had little or no formal biological training, has shown that at least some science can be made accessible to a wide audience. The publication of this and a series of other papers on the results of the first 5 years of the survey will hopefully show that anyone can become involved and make valuable and novel contributions. If involvement in the survey has also made some people more sympathetic to ladybirds in the first instance, and the natural flora and fauna in the second, this in itself may be the most valuable result of the survey.

As this paper shows, there is still a need for ladybird records from anywhere in

Britain, but particularly from some of the less well populated regions. We would be pleased to hear from anyone who might be able to help to increase our knowledge of this attractive group.

Acknowledgements

I wish to acknowledge with thanks, all the recorders of the Cambridge Ladybird Survey. This paper is a testimony to their endeavours. Heather Ireland contributed greatly to the growth and success of the survey in its early years. Drs Peter Kearns and Peter O'Donald have also give valuable assistance. I would also like to thank Joanne Griffiths for typing the manuscript, and Tamsin Harris for editing and correcting it.

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SHORT COMMUNICATIONS

***Ptinus subpilosus* Sturm (Coleoptera:Ptinidae) rediscovered in Gloucestershire.**— It is many years now since *Ptinus subpilosus* was last seen in Gloucestershire. The only records in Atty (1983) are from the Forest of Dean area in the western Vice-County: Dean, 1880, A.E. Hodgson; Speech House and Newnham, E.W. Morse (pre-1900). Atty (pers. comm.) knows of no more recent records.

Two specimens were found beneath loose webby bark on an ancient oak pollard in Rendcomb Park (SP 0110), E. Glos., in company with larvae of *Ctesias serra* (F.) on 17.iv.90. Rendcomb is an old deer park, in existence by the 16th century, and has a large number of such oaks. It is already known to have an interesting deadwood fauna, from the records of I.S. Menzies, E.G. Neal and H.K. Airy Shaw in the 1940s (detailed in Atty, 1983). A visit by the Gloucestershire Invertebrate Group in 1988, organized by I.S. Carter, found species such as *Platyrhinus resinosus* (Scop.) and, in the adjoining Clifferdine Wood, *Selatosomus bipustulatus* (L.). The latter had been found in the Park previously by Menzies, in 1946.

My thanks to J. Tolputt for permission to record insects at Rendcomb, to I.S. Carter for his records from the G.I.G. Meeting, and to D.B. Atty for keeping me up to date on Gloucestershire's Coleoptera.—Keith N.A. Alexander, 22 Cecily Hill, Cirencester, Gloucestershire GL7 2EF.

REFERENCE

Atty, D.B. 1983. *Coleoptera of Gloucestershire.* Published privately. Cheltenham.

***Trachys troglodytes* Gyllenhal (Coleoptera: Buprestidae) in Cornwall.**—This beetle was first discovered in Cornwall by R.T. Bannister, who swept it at Selena, St Buryan (SW 4023), in September 1927. This is the only record held by the Cornish Biological Records Unit.

The tell-tale shiny black spot and leaf-mines on the foodplant, devil's-bit scabious (see Alexander, 1989) were found at a number of sites in West Penwith and on the Lizard Peninsula in West Cornwall, and at one site on Bodmin Moor in the East, during a 9-week visit to the county in 1989. The first sighting was made by Miss M.E. Scruby, the rest by S.J. Grove and myself. The details are as follows: Lower Predannack Cliff, Lizard (SW 669157), 21.v.1989, immature mines on foodplant in patch of wet heath on clifftop (MES). Boswednack Farm, W. Penwith (SW 441382), 22.v.1989, immature mines frequent in area of wet heath and flush within unimproved coastal farmland (KNAA). Zennor Head, W. Penwith (SW 449394), 22.v.1989, egg-spots on foodplant foliage in slightly flushed clifftop grassland (SJG). Tregerthen Cliff, W. Penwith (SW 462397), 23.v.1989, egg-spots on foodplant foliage in sedgey flush within short turf, clifftop grassland (SJG). Pen Enys Point, W. Penwith (SW 493408), 24.v.1989, egg-spots on foodplant foliage in short turf, grazed clifftop grassland and wet flushes (SJG). Pendeen Cliff, W. Penwith (SW 384358), 27.v.1989, egg-spots on foodplant foliage in cattle-grazed sedgey flush (KNAA). Portheras Cliff, W. Penwith (SW 389357), 27.v.1989, egg-spots and immature mines in area of close-turf wet heath (KNAA). Kynance Cliff, Lizard (SW 679135), 29.v.1989, egg-spots and adults in sedgey flushes on cliff slopes (KNAA). It is remarkable that there are no earlier records from this well-recorded site. Pedn-myin, Coverack Cliffs, Lizard (SW 793192), 3.vi.1989, eggspots and immature mines in area of cattle-grazed flushed grassland (MES). Witheybrook Marsh, Bodmin Moor (SX 252726), 2.vii.1989, egg-spots and failed mines in one small area of an extensive valley mire with abundant foodplant—at 285 m altitude, the highest site I know (KNAA). The species is clearly widespread on the clifflands in the west of the county, but no cliff sites were found in the east despite visiting many with devil's-bit plentiful. However, many of these sites are no longer grazed by domestic stock, and it may be that the suitable short turf conditions are only being maintained in the west through exposure, and that the species has been lost from the more sheltered eastern cliff sites.

My thanks to Stella Turk for access to the records held by the Cornish Biological Records Unit.—K.N.A. Alexander, 22 Cecily Hill, Cirencester, Glos. GL7 2EF.

REFERENCE

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BUTTERFLIES OF THE PARIA PENINSULA, NE VENEZUELA

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The rocky Paria Peninsula represents the last of a series of isolated mountain groups extending east from the Andes on continental South America (the chain terminates 25 miles further east in the mountains of Trinidad). Originally cloaked in rain forest, man has cleared or otherwise damaged the lower altitudes of all these mountain groups, leaving 'islands' displaying comparatively undamaged montane rain forest. These mountain groups provide a classic demonstration of island biogeographical theory (MacArthur & Wilson, 1967)—the number of species from the parent Andean population decreasing with increasing separation from the Andes (Phelps, 1966; Haffer, 1974; for birds). The Parian Montane Centre, of which the Paria Peninsula is part, has been identified as an important centre of endemism within South America (Cracraft, 1985).

The observations described below represent part of the activities of the Cambridge Columbus Zoological Expedition to Venezuela 1988, which spent 7 weeks in the region of Macuro (ca 10°35′N 62°08′W) in late July and August 1988. Macuro lies just outside the southern boundary of the 11-year-old Paria Peninsula National Park which has received relatively little scientific attention. The expedition's aims were to study the bird, dragonfly and butterfly species present in the area, if possible identifying rare or endemic species and their ecological requirements, and thus to provide information useful in Park management and assessment.

THE STUDY AREA

The vegetation found in the region of Macuro has been described by Bond *et al.* (1989). Butterfly samples were taken by netting or photography in the following areas: Zone A rough cultivated land in and around the village of Macuro, and a coastal path eastwards to Aricagua bay. Zone B secondary forest in varying stages of regeneration on paths north from Macuro and Aricagua to the 400 m contour (the southern boundary of the National Park). Zone C forest in the region of Rancho Los Chorros (the expedition's base), at 400–550 m on the cross-peninsula path from Macuro to Uquire (this zone contained a mixture of mature secondary and lower montane forest types, and also three recently abandoned small plantations). Zone D primary montane forest above 550 m on the path mentioned in zone C, and on the study transect used by the Expedition between the Rancho and the summit of Cerro El Olvido at 885 m (the forest at this height showed characteristics of cloud forest). The forest types found on the transect were classified as lower or upper montane forest (*sensu* Grubb & Tanner, 1976). Zone E dry scrub to a height of 200–300 m above Uquire, on the steeper northern side of the peninsula.

Observations were concentrated in zones A, B and C, with weather limiting forays into zone D. Uquire (zone E) was visited once. The majority of specimens collected were identified by Dr M. Cock, of the CAB International Institute of Biological Control, Nairobi, Kenya.

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Species list

Species not occurring on Trinidad are indicated by 'not T'; species recorded as single specimens are indicated by '*'.

Hesperiidae

Moeris vopiscus vopiscus Herr.-Sch. Zone C, frequent
Panoquina sylvicola Herr.-Sch. Zone C, frequent
Ouleus fridericus. Zones A,B, several seen
Urbanus dorantes dorantes Stoll. Zones A,C, frequent around rancho
Urbanus doryssus doryssus Swain. Zones C,D, several seen
Urbanus tanna Evans. Zone B, frequent
Phareas coeleste West. Zone C, *, near stream. Not T
Talides sinois sinois Hubn. Zone C, *
Chioides catillus catillus Cramer. Zone A, common
Polygonus manueli manueli Bell & Comstock. Zone D,*
Epargyreus socus ?chota Evans. Zone D, *
Astraptes fulgerator fulgerator Walch. Zone D, *, in sunpatch
Astraptes anaphus Cramer. Zone D, *
Vettius phyllus phyllus Cramer. Zone D, just above zone C, *
Phanus marshalii Kirby. Zone C, two seen
Quadrus cerealis Stoll. Zone C, *
Entheus priassus priassus Linnaeus. Zone C, *
Pyrgus orcus Stoll. Zones B,C
Synapte malitiosa pericles Moschler, Zone A, frequent
Lerema ancillaris ancillaris Butler. Zone A, frequent
Aguna coelus Stoll. Zone C, *

Papilionidae

Papilio torquatus Cramer. Zone B,C,
Papilio thoas L. Zone A, low altitudes in zone B, in clearings near streams, frequent
Parides anchises cymochles Doub. Zone A
Battus polydamas L. Zones A,B,C,E, frequent

Pieridae

Phoebis rurina Felder. Zone C, several seen. Not T
Phoebis sennae L. Zone A, common
Eurema leuce Bois. Zones A,B,C, common
Eurema ?venusta Bois. Zone A, common
Eurema albula Cramer. Zones A,C, common
Eurema gratiosa Doub. Zone A, several seen in Macuro
Ascia monuste L. Zone A, low altitude in Zone B, common

Lycaenidae

Arawacus aetolus Sulzer. Zones B,C, several seen

Riodinidae

Mesosemia methion Hew. Zone C, several seen. Not T
Mesosemia phace Godman. Zone C, two seen. Not T
Nymula calyce F. Zone A, *
Dynamine mylitta Cramer. Zone A, several seen

Danainae

Lycorea cleobaea Doub. Zones B,C,D, frequent
Danaus plexippus L. Zones A,E, common, C, occasional
Danaus eresimus Cramer. Zone A, frequent

Libytheinae

Libythea carinata Cramer. Zone E, *

Nymphalinae

Smyrna blomfildia Hubn. Zone C, frequent, feeding on rotting fruit, doubtful resident of Trinidad
Archaeoprepona amphimachus F. Zones B, occasional, C, frequent, feeding on damaged fruit, usually while still on tree
Catonephele acontius L. Zone C, *, feeding on rotting fruit
Hamadryas arethusa Cramer. Zones A,B,C, common
Hamadryas amphinome L. Zones A,B,C, common
Hamadryas laodamia Cramer. Zone C, *
Colobura dirce L. Zone C, *
Mestra hypermestra. Zone B,E, several seen
Precis lavinia. Zone A, common
Anartia jatrophe L. Zone A, common
Anartia amathea L. Zone A, common
Myscelia leucocyana. Zone B, two seen
Marpesia chiron F. Zone A,C
Marpesia petreus Cramer. Zones A,B, several seen in partly shaded areas
Siderone marthesia Cramer. Zone C, *
Janatella leucodesma Felder & Felder. Zone A, several seen

Heliconiinae

Heliconius erato L. Zones B,C, frequent
Heliconius hecale barcanti Brown. Zone C,

sunlit openings in forest, frequent (Not T (one vagrant record M. Cock. pers. comm.)
Heliconius ethilla Godart. Zone D, *
Heliconius clysonymus clysonymus Latr. Zone C, *. Not T
Dryas julia F. Zones C,D,E, common

Ithomiinae
Mechanitis lycimnia F. Zones B,C, frequent
Mechanitis isthmia Bates. Zones B,C, frequent
Hymenitis andromica Hew. Zone C, several flying amongst shaded forest undergrowth
Greta andromica andromica. Zone C, *. Wing-tips more extensively black than Trinidad specimens (M. Cock, pers. comm)
Aeria eurimedia Cramer. Zones C (above 500 m altitude),C, several seen
Ithomia iphianassa Doub & Hew. Zone C, several seen
Pteronymia artena Hew Zone C, *
Hypoleria ocalia Doub. & Hew. Zone B, low altitudes, several seen

Brassolinae
Opsiphanes cassiae L. Zone C, frequent feeding on rotting fruit
Caligo eurilochus Cramer. Zones B,C; particularly frequent in mango plantations near Macuro, feeding on rotting fruit
Eryphanis polyexena Meerburg. Single specimens, Zones A,C; several seen separately, Zone D
Dynastor darius Fabricius. Zone D, one specimen at 850 m

Morphinae
Morpho peleides Koll. Zones B,C,D (up to 600 m), frequent. Individuals appeared to 'trapline' along forest streams in Zones B and C

Satyrinae
'Euptichia' hermes F. Zones B,C, common, flying low amongst vegetation
'Euptychia' hesione Sulzer. Zone C, frequent
'Euptychia' arnea F. Zone C, frequent

Two day-flying moth species were also noted:

Geometridae
Cyllopa jatropharia L. Zone C

Uraniidae
Urania leilus L. Zone A. Individuals seen flying along beach in Macuro

The information given above is summarized in two tables. Table 1 identifies the number of species from each family or sub-family recorded in each forest zone. Table 2 identifies families containing non-Trinidadian species, and the forest zones from which these were recorded.

Table 1. Summary of the forest zones frequented by identified species from each family[1].

Family Zone	Total N sp.	Hesperiidae	Papilionidae	Pieridae	Lycaenidae	Riodinidae	Danainae	Libytheinae	Nymphalinae	Heliconiinae	Ithomiinae	Brassolinae	Morphinae	Satyrinae
A	28	6	3	6	0	2	2	0	8	0	0	1	0	0
B	22	3	2	2	1	0	1	0	6	1	3	1	1	1
C	48	11	2	3	1	2	2	0	9	4	7	3	1	3
D	13	6	0	0	0	0	1	0	0	2	1	2	1	0
E	5	0	1	0	0	0	1	1	1	1	0	0	0	0
N species in each family[2]		21	4	7	1	4	3	1	16	5	8	4	1	3

[1] Five specimens remain to be identified (two lycaenids, two nymphalids and one satyrid). Distributional data for these is not included in Table 1, but was used in compiling Table 2.
[2] As each species could be recorded from several zones, this figure does not equal the sum of the relevant column.

Table 2. The occurrence of species not found on Trinidad in the Paria fauna; each family considered separately (including data on five species yet to be identified—see Table 1).

Family	N species recorded on Paria	N non-Trinidadian species	Zones non-Trinidadian species found
Hesperiidae	21	1	C
Pieridae	7	1	C
Lycaenidae	3	2	B(low alt.),C
Riodinidae	4	2	C,C
Nymphalinae	18	3	B,C,C,
Heliconiinae	5	2	C,C,
Satyrinae	4	1	B/C

Discussion

It is clear from Table 1 and the species list that many species do not occur in one zone exclusively. This is likely to be an artefact of the way in which the zones were defined, which was dictated by fieldwork practicalities, and the fact that the forest types did not have distinct boundaries. The zones most affected in this way were zones B and C. The former contained a mixture of open tracks, active and disused plantations, and secondary forest growth in varying stages of regeneration; the latter was an area of mature secondary growth overlapping with the lower boundary of undamaged montane forest, but also containing some small clearings due to plantations. The narrowness of the Peninsula (4–5 miles in the region of Macuro) also compresses the size of the zones, giving only short distances between them.

A number of broad generalizations can still be made. 1. Species representative of more mature forest (primary or secondary, zones C and D) are drawn from Hesperiidae, Nymphalinae, Heliconiinae, Ithomiinae, Brassolinae and Satyridae. 2. Species representative of coastal or extensively cultivated land (zones A and B) are drawn from Pieridae, Danainae and Nymphalinae. Libytheinae (zone E) may also be included in this category. 3. Species of Papilionidae and Brassolinae were mainly recorded in secondary growth. 4. Individual species of each family may be restricted to one forest type, though generally can cope with a range of habitats. There was no clear separation of species found in primary or mature secondary forest.

The forests of the Paria Peninsula have not suffered the clear felling which has destroyed much forest in South America. Rather, small areas are cleared for crops, mainly banana, cacao, maize and some coffee. This process has resulted in almost complete replacement of primary forest on the more populated southern coast of the Peninsula to a height of 400–500 m in the region of Macuro, and, further west, to a height of approximately 800 m on Cerro Patao (Bond *et al.*, 1989). The northern side of the Pensinula is less developed, with partial replacement to a height of 200–300 m in the region of small villages such as Uquire. The eastern part of the Paria Peninsula National Park, whose boundary is at 400 m on the south side and at sea level on the north side of the peninsula is thus relatively undamaged. The observations reported here suggest that the butterfly fauna is most diverse in areas of primary and mature secondary forest, and thus that many of these species can tolerate a small degree of habitat disturbance. The forest-dwelling dragonflies of Paria can tolerate a similar level of habitat disturbance (Convey, 1989).

Twelve of the 83 butterfly species recorded (including five yet to be identified) do not occur on the neighbouring island of Trinidad (M. Cock, pers. comm.). All but

two of these species were found in zone C on Paria (Table 2), the zone containing mature secondary and undamaged primary montane forest. The remaining species were found in shaded, forested parts of zone B. If the montane forests of Paria and Trinidad are considered as 'islands', separated by a barrier to colonization (the dry scrub forest of extreme eastern Paria, and sea-water of the Bocas del Dragon), the degree of overlap of the two faunas can be estimated. The overlap here is 12 (species not shared) out of a total of 56 (species recorded in zones C and D on Paria). Almost 80% of the montane species are shared. The true figure for the number of montane species on Paria is probably lower, as our records for zone C include a number of species also recorded in zones A and B, which may be invading coastal or disturbed forest species. That there is little barrier to the movement of this type of species is suggested by the observation that all but one of the 43 species recorded in zones A,B and E are also found on Trinidad.

The proportion of non-Trinidad species found appears to be related to family (Table 2). Seven of the species found are accounted for by four families, the Lycaenidae, Riodinidae, Heliconiinae and Satyrinae. These families only account for 16 of the species recorded on Paria, and contain generally smaller, weaker flying members than the remaining families (Hesperiidae, Pieridae and Nymphalinae). Species from the families not represented in Table 2, with the exception of Ithomiinae, are usually regarded as strong fliers, many with migratory tendencies (eg Danainae).

Acknowledgements

The work of the Expedition could not have been carried out without the support of many sponsors, all of whom are gratefully acknowledged in our final report (Bond *et al.*, 1989). INPARQUES support and permission to work in the National Park were vital. Finally I would like to thank Dr Matthew Cock for the identification of most of the captured specimens, and relating them to the Trinidad fauna.

Author's note

A small number of specimens remain to be identified. However as the author is now on fieldwork in the Antarctic until spring 1991, it was felt to be most useful to submit the list as it stands, with a shorter note to appear after return.

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BOOK REVIEW

Orthocerous weevils. Coleoptera Curculionoidea (Nemonychidae, Anthribidae, Attelabidae and Apionidae) by M. G. Morris. Handbooks for the Identification of British Insects Volume 5, Part 16, London, 1990, Royal Entomological Society, £17, 108 pages. —The 84 species of *Apion* make up the bulk of this book, keyed first to 22 subgenera. Despite their small size, most species are readilly identifiable, and as ever in this series, the large number of excellent figures serve to illustrate almost every character used in the keys. The ten pictures of whole insects show the wide range of shape and form taken by these pretty and elegant little creatures. The other minor families are dealt with no less thoroughly. A revised check list and list of host-plant/beetle associations complete this first part of the weevil handbooks. The only complaint is a repitition of the current style of putting all the figures together at the back instead of littered through the text.

R.A.JONES

ANNOUNCEMENT

Glow-worm survey. With the aim of trying to discover what factors affect the distribution of the glow-worm *Lampyris noctiluca*, I am undertaking a survey of this interesting beetle. In particular, I am interested in the effects of streetlighting. As an amateur astronomer, I am concerned about the effect of streetlighting on our views of the night sky. Later this year, a campaign called "Dark Skies 2000" is to be launched to try to restrict the glare from streetlights without affecting their use in improving road safety.

Glow-worms may be particularly sensitive to streetlights, but there is much work to be done disentangling the various other factors, such as changes in habitat. I would like to hear from anyone who has observed or recorded glow-worms, either the glowing wingless females or the winged males, in recent years in Britain. In particular, records from lepidopterists who find the males in their moth traps would be very interesting, preferably with date, exact location and presence of known colonies of females.

A survey was carried out by the British Naturalists' Association in the early 1970s by the late Anthony Wootton, and several articles on glow-worms and how to rear them were published in *Country-Side*. I would also be interested to hear of any other detailed studies that have appeared in the literature of whatever date.

Glow-worms are found mainly in southern England in chalky areas and around the south-west coast. But they have been recorded all over Britain, even as far north as Caithness. The females glow during midsummer only, and die in mid-August, so it is worth searching likely areas next summer, starting in early June. The glow-worm advertises its presence from many yards away and deserves attention from entomologists, not least to discover whether or not its numbers are in decline. — Robin Scagell, 1 Milverton Drive, Ickenham, Uxbridge, Middlesex UB10 8PP.

SEASONAL FLIGHT ACTIVITY OF BUMBLEBEES (HYMENOPTERA: APINAE) AS MONITORED BY MALAISE TRAP CATCHES

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Watts (1983) positioned a series of Malaise traps in Bernwood Forest in the English Midlands to study the hoverflies (Diptera, Syrphidae). Aculeate Hymenoptera were also trapped and after being sorted by Watts were sent to me for mounting and identification. This paper is primarily a descriptive report of the bumblebees trapped, with details of the relative abundance of each species. Similar reports of the social wasps and solitary species have been reported (Archer, 1988, 1990). Information about habitat conditions for Bernwood Forest are given by Watts (1983).

Seasonal abundance data of some British bumblebees has only recently become available. Sladen (1912), Free & Butler (1959) and Alford (1975) reported the length of seasonal activity of many species but did not report on seasonal abundance. Prŷs-Jones & Corbet (1987) reported the seasonal abundance of four species: *Bombus terrestris* (L.), *B. pratorum* (L.), *B. hortorum* (L.) and *B. pascuorum* (Scop.). Outside Britain Løken (1973) gave flight data for each caste and sex of Scandinavian species and Moorse (1982) and Plowright & Laverty (1984) reviewed world data. Information on foreign bumblebees, which was also considered by Alford (1975), dealt with dates of seasonal activity rather than seasonal abundance.

METHODS

Five Townes Malaise traps (Townes, 1972) were operated at Bernwood Forest from 1 April to 30 September during 1980, 1981 and 1982 and were sampled at weekly intervals providing 26 samples per year.

Orientation and siting in a habitat can greatly affect a Malaise trap catch (Disney *et al.*, 1982) so the position and orientation of each trap was the same each year. The efficiency of a Malaise trap in sampling bumblebees is unknown but traps are probably selective not only in the species trapped but also in the sex and caste of individual bees taken. However for common species the Malaise trap would seem to be very effective in reflecting the amount of activity of aerial insects (Owen, 1983).

RESULTS AND ANALYSIS

Five species, *B. lucorum* (L.), *B. terrestris*, *B. pratorum*, *B. hortorum* and *B. pascuorum*, were captured in sufficient numbers for further analysis. A further four species, *B. ruderarius* (Müller), *Psithyrus barbutellus* (Kirby), *P. sylvestris* Lepeletier, *P. vestalis* (Geoffrey in Fourcroy), were captured as single specimens or in small numbers.

The numbers of each sex/caste of the five species trapped are given in Table 1. The most recorded species, *B. lucorum*, was more than five times as abundant as the least recorded species, *B. terrestris*. The most frequently recorded sex/caste was workers except for *B. pratorum* and *B. hortorum* where males were most frequently recorded.

The seasonal level of activity of each sex and caste of the five species is given in Fig. 1. Rather less data were available for *B. pratorum*, *B. terrestris* and *B. hortorum*

Table 1. The number and percentages of each sex/caste of bumblebees trapped at Bernwood Forest between 1 April and 30 September from 1980 until 1982.

Species	Queens	%	Workers	%	Males	%	Total
B. pratorum	34	23.9	38	26.8	70	49.3	142
B. terrestris	38	32.2	49	41.5	31	26.3	118
B. lucorum	109	16.7	418	63.9	127	19.4	654
B. hortorum	32	13.6	91	38.6	113	47.9	236
B. pascuorum	112	20.4	367	66.8	70	12.8	549

so that for these species the weekly data have been combined into biweekly readings so that the patterns of seasonal activity are more clearly discernable. The queens were already active when the trapping started during April and were recorded throughout, or for most of, the trapping period. During June numbers of queens

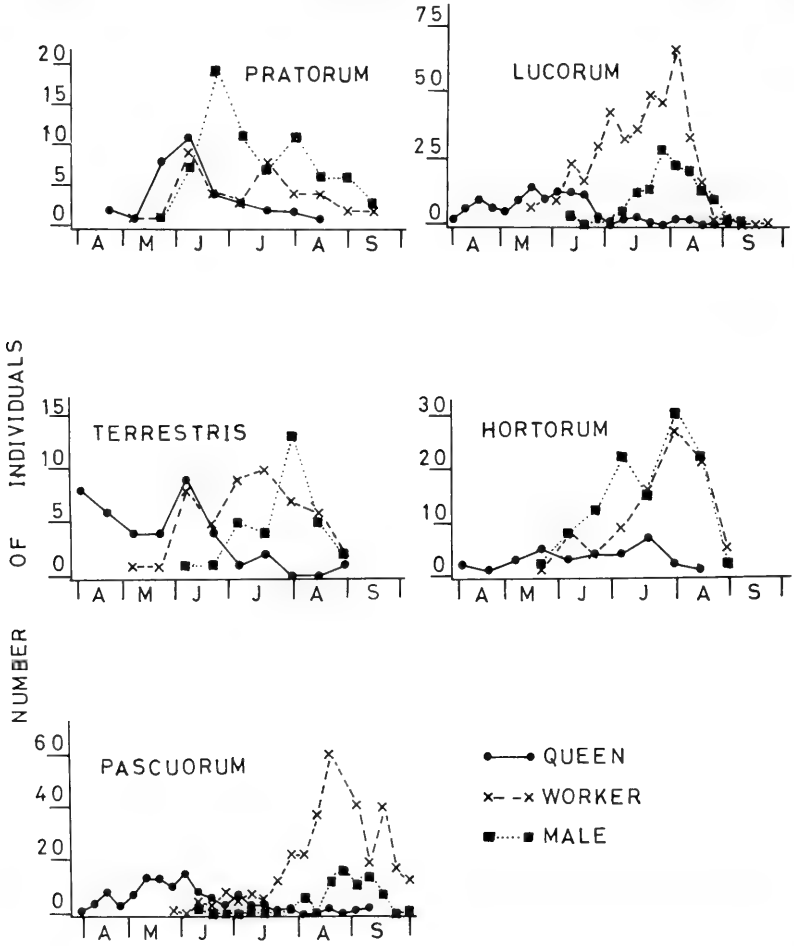

Fig. 1. The adult flight activity of *Bombus* species at Bernwood Forest from 1980–1982.

dropped to a lower level at which they remained for the rest of the season except for *B. hortorum*. Queens of *B. hortorum* were only taken in small numbers and because of this small sample size probably no trend is discernible.

Workers of all the species were recorded first in May but the timing of the highest worker activity varied between the species. Workers of *B. pratorum* showed the earliest peak of activity during early June although this species also showed a second peak during mid-July. The extended peaks for *B. terrestris* and *B. lucorum* came next lasting from June until July or even early August. The peak for *B. hortorum* was later from mid-July until mid-August while the peak for *B. pascuorum* was later still from mid-August until mid-September.

Males of all species, except *B. pratorum*, first appeared during June; those of *B. pratorum* during late May. The peaks of male activity varied between species with *B. pratorum* having the earliest peak during late June and a second peak during early August. The males of *B. hortorum* also showed two peaks of activity, during early July and early August. The peaks of *B. terrestris* and *B. lucorum* were next from late July until early August. The peak of *B. pascuorum* was last from late August into September.

Although all the species were taken throughout most of the trapping period the period of maximum activity was shorter for *B. hortorum* and *B. pascuorum* as these species took longer to reach the exponential growth stage of activity and *B. hortorum* stopped rather abruptly at the end of August. *B. pratorum* reached the exponential growth stage of activity first but then activity did not come to an end because a second cycle of activity occurred.

Discussion

The inter-specific differences relating to the sequence of maximum activity recorded agree with Alford (1975) and Prŷs-Jones & Corbet (1987). *B. lucorum*, *B. terrestris* and *B. pascuorum* are called long-cycle species as their life-cycle of about 6 months is longer than that of the short-cycle species, *B. pratorum* and *B. hortorum*, although these two species with a second peak of activity increase their length of seasonal activity. The second peak of activity of *B. pratorum* and *B. hortorum* is usually considered as evidence of a second generation (Prŷs-Jones & Corbet, 1987). However Duchateau & Velthius (1988) showed for *B. terrestris* that different colonies varied in the date at which the colony switched to male production. The early switching colonies produced males with very few queens while late switching colonies produced more queens than males. Although the population of different switching colonies still showed a single peak of worker activity such a population might show two peaks of male activity. Thus the data for *B. pratorum* probably does indicate the presence of two generations a year as both males and workers showed two peaks of activity. However for *B. hortorum* since only the males showed the two peaks of activity the presence of early and late switching colonies is perhaps more likely than a second generation.

What are the reasons for the variations of activity of each sex/caste during the season? For example why are more queens recorded as being active during the first part compared with the second part of the season? There will be more new queens reared than there are spring queens because of the mortality of over wintering queens. Perhaps an explanation can be found by an examination of queen behaviour. The spring queens engage in foraging for food to aid ovary development, in searching for suitable nest sites and again in foraging for food to secrete wax for nest building and to feed the first brood. Such foraging and searching activities will increase the

chances of the queens being trapped. In contrast the new queens at first remain in the nest feeding on stored pollen to aid development of their fat bodies and on honey to fill their crops (Free & Butler, 1959). Then follows a brief period of activity outside the nest for mating before entering the over wintering sites. Queens of *B. pratorum* and *B. terrestris* start entering over wintering sites from July onwards (Alford, 1975). The relative short period of activity by the new queens outside the nest probably reduces the predation risk but will also decrease their chances of being trapped.

Again why should males be the most frequently trapped sex/caste for *B. pratorum* and *B. hortorum* compared with workers for the other species (Table 1)? Males are active outside the nest when patrolling their mating circuits and foraging from flowers since males do not normally return to the nest once having left it (Alford, 1975). Such activities increase the chances of the males being trapped. The occurrence of two periods of male activity for *B. pratorum* and *B. hortorum*, while the other species only have one period, could account for the greater relative frequency of males of these two species in trapped samples.

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BENHS INDOOR MEETINGS

27 February 1990

Membership

The names of Kevin Reiling, Boudjema Samraoui, Michael Halpin, David John Wilson, Robin Christopher Brooker and Peter D. Orton were read for the second time and these persons were duly elected as members.

Communications

Prof. J. A. Owen said that he had seen a male brimstone butterfly on 20.ii.90 in his Epsom, Surrey, garden, and on Box Hill the next day. Several other members also saw this butterfly during that period of warm weather.

Mr B. Baker reported seeing what he believed was a common pug moth, *Eupithecia vulgata* (Haw.) on his sitting room wall at Caversham, Reading, Berks, on 25.ii.90.

Mr C. Plant said that a humming bird hawk moth had been seen at Duxford, Cambs., on 25.ii.90.

The ordinary meeting then closed and was followed by the Annual General Meeting.

Annual General Meeting

Minutes of the Annual General Meeting of the Society held at the rooms of the Royal Entomological Society at 6.30 pm. Chairman: The President, Mrs F.M. Murphy. *Present:* 31 members.

Minutes of the last Annual General Meeting were read and signed.

The Secretary read the Council's report and the report of the Treasurer who was unable to be present. The Editor, Librarian and Curator then read their reports, and Dr M. Scoble read the report of the Hering Memorial Research Fund. The President proposed the adoption of the reports, the motion was seconded by Mr D. Young. (See pages 185–192.)

The President then read the names of the Officers and Members of Council recommended by the Council for 1990–91 and, as no other names had been submitted, she declared the following duly elected: President: C.W. Plant; Vice-Presidents: Mrs F.M. Murphy, A.J. Halstead; Treasurer: Col. D.H. Sterling; Secretary: Dr J. Muggleton; Editor: R.A. Jones; Curator: P.J. Chandler; Librarian: S.R. Miles; Lanternist: M.J. Simmons; Ordinary Members of the Council: A. Godfrey, R.D. Hawkins, M.K. Henderson, R.S. Key. I.F.G. McLean, S.L. Meredith, D.A. Moore, R.K.A. Morris, J.A. Owen and D. Young.

The Secretary then read Bye-law 22 (d) and invited motions or questions. There were none.

The President then read her report and gave her address.

The President then installed the new President, Mr C.W. Plant.

The President proposed a vote of thanks to the retiring President, and this was seconded by Mr R. Dyke. The President asked for permission to publish the presidential Address, this was given.

The Rev. David Agassiz proposed a vote of thanks to the retiring Officers and Council, this was seconded by Mr D. Young and passed.

Auditors: the re-election of Messrs A.J. Pickles F.C.A. and R.A. Bell was proposed by the President, seconded by Messrs R.A. Jones and D. Young, and passed unopposed.

14 March 1990

Exhibits

The President, Mr C. Plant exhibited a specimen of *Sphaerophoria bankowskae* Goeldlin, a hoverfly new to Britain. This species was described in 1989 by Goeldlin from continental material and its occurrence in Britain was predicted in the same year by Martin Speight. The specimen exhibited was captured in 1986 by the exhibitor at Canfield Hart, North Essex. It fails to key out in the Society's hoverfly book, and in a more recent key by Martin Speight in *Dipterists Digest* (**1**: 2–34) it runs to *S. philanthus* Meig. but has quite different genitalia. Examples of the other British *Sphaerophoria* species were exhibited for comparison, together with a drawing of the male genitalia of *S. bankowskae* and *S. philanthus*.

Mr R. A. Jones showed a live specimen of the harvestman *Megabunus diadema* (F.) found by sieving leaf litter under an ancient beech hedge on Crockhamhill Common, Westerham, Kent, 11.iii.90. In this species, the raised ocularium carrying the eyes is surmounted on each side with five long spines.

Mr C. B. Ashby showed a couple of live young larvae of a water beetle, believed to be *Dytiscus marginalis* L. found in Crater Pond on Bookham Common, Surrey, on 11.iii.90. This pond dried up during the drought of 1989 and did not refill until the heavy rains of the new year. It was therefore unlikely that a female *Dytiscus* beetle had overwintered in the dry pond. Since it would take at least 14 days for eggs to hatch and the larvae to reach a size of about 4 mm, Mr Ashby surmised that a female *Dytiscus* must have flown to the pond at sometime in February.

Communications

Mr A. J. Halstead drew attention to a letter published in the 3rd March edition of the magazine *Amateur Gardening* in which a reader complained of picking about 150 caterpillars, some as big as 2 inches long, from cauliflowers being grown at Wincanton, Somerset, in late January. Mr Halstead wondered if these were large cabbage white butterfly larvae. Dr B. McNulty said they were more likely to be some sort of noctuid larvae.

Lecture

Prof. N. Moore opened his talk on the colonization of ponds by dragonflies by considering the status of ponds in ancient and modern Britain. Some of Man's activities, such as the digging of gravel pits, have benefitted those species capable of colonizing this type of water. Prof. Moore described some of the studies he had carried out on the Arne peninsula, Dorset, and at Woodwalton Fen, Cambridgeshire. At Arne he had an opportunity to study dragonflies at ponds of varying sizes formed as a result of wartime bombing. He found that the number of males seen per unit area of pond was related to their territorial behaviour rather than their actual numbers. At Woodwalton Fen a series of new ponds were dug and he was able to record the dragonflies as they arrived. Some species would breed regularly in the ponds, others occasionally, while some species visited without breeding. The speaker stressed the importance in recording schemes of differentiating between sightings of the adults and evidence of breeding, such as finding nymphs or exuviae.

When Prof. Moore retired he had a 40 × 15 m pool dug in his garden. To encourage dragonflies the pool was constructed with shallow margins in a site not overhung by trees but with sheltering vegetation nearby. The pond was planted with

emergent and floating plants and during the first year 13 species of dragonfly were noted. This is an indication of the efficient dispersal and colonization ability of dragonflies. Prof. Moore closed his talk by showing a series of slides of new ponds constructed on farms under the guidance of the Farming and Wildlife Trust, and of a dragonfly nature reserve being developed in Japan.

The President invited Prof. Moore to mention the book he has recently written. It is entitled *Bird of time* and has the subtitle of *Science and politics of conservation—a personal view*. It is published by Cambridge University Press and it covers some of the environmental problems in which Prof. Moore was involved during his career. These include investigations into the adverse effects of persistent organochlorine insecticides, the impact of myxomatosis, and establishing the criteria for identifying sites of special scientific interest.

28 March 1990

Exhibits

Mr I. D. Ferguson exhibited an oak log containing mines of *Ectoedemia atrifrontella* (Stainton) (Lepidoptera; Nepticulidae) in the bark. The mines—were found whilst coppicing with a British Butterfly Conservation Society working party at Church Wood, Blean, near Canterbury, Kent on 11.ii.90.

Mr C. B. Ashby showed a microscope slide of a cast skin from the larva of the water beetle, *Dytiscus marginalis* L. shown at the previous meeting. Mr Ashby drew attention to the size of the mandibles relative to the rest of the insect.

Prof. J. A. Owen referred to Mr Ashby's *Dytiscus* beetle which had apparently flown and laid its eggs in late February. He said that beetles fly in winter more often than is generally realized. He had placed an interception trap in a wood at Headley, Surrey, and visited it every fortnight. This had caught beetles throughout the recent winter except in the frosty period in early December. In late February there had been about 40 species in the trap. He said that a friend has seen a *Dytiscus* beetle swimming under thick ice and it was capable of activity at low temperatures.

Mr E. Bradford said that he had also seen this, and added that the oak bark mining moth shown by Mr Ferguson could be found in many of the woods around Canterbury.

Mr C. W. Plant showed some less frequently recorded lacewings (Neuroptera: Planipennia) taken in Rothamsted light traps during 1988 and 89. *Chrysopa commata* Kis & Ujhelyi and *C. phyllochroma* Wesmael can only be separated reliably by examining the male genitalia. Both species, which were formerly believed to be a single species, *C. phyllochroma*, are widespread in Britain but *commata* is by far the more numerous. *Hemerobius simulans* Walker can be found as early as February and as late as November. This has been attributed to its bivoltine habits but recent records suggest that it may overwinter as an adult. It is said to be associated with larch and spruce. *Hemerobius pini* Stephens and *H. contumax* Tjeder are frequently confused and the latter appears to be extremely local. *Micromus angulatus* (Stephens) seems to be rare and local but this may reflect a lack of knowledge of how to find it. It should be searched for by beating birch scrub and by sweeping the vegetation beneath birches at dusk. *Drepanepteryx phalaenoides* (L.) is a very distinctive species which is frequent in the north of England but rare elsewhere. In recent years there have been several records in Surrey and Kent.

Communications

Several members reported seeing insects that indicated the earliness of the season.

Mr S. MILES noted a small specimen of the painted lady butterfly at Noarhill, Hants, on 18.iii.90, prof. J. A. OWEN saw a holly blue in his garden at Epsom, Surrey, on 17.iii.90 and Mr I. D. FERGUSON saw an orange tip butterfly near Westerham, Kent, on 17–18.iii.90. Dr J. MUGGLETON recorded a male muslin moth at light on 21.iii.90 and saw a pair of 2-spot ladybirds *in cop* at Staines, Middx. He said that these ladybirds were mating about a month in advance of their usual time.

LECTURE

Mr I. M. WHITE spoke on picture wing flies (Diptera: Tephritidae). Worldwide this family has about 4000 described species and some are of considerable economic importance as plant pests or as a means of achieving biological control of some weeds. The name picture wing refers to the dark bands or reticulate markings that most species have on their wings. About 40% of the tephritids have larvae that develop in edible fruits; many of the others are associated with plants of the Compositae family. Sixty-three of Britain's 73 tephritid flies develop on Compositae, and 23 of them are restricted to the tribe Cardueae, which includes the thistles and knapweeds. One British species, *Euphranta toxoneura* (Loew) is unusual as its larvae develop in galls of a sawfly, *Pontania* sp., on willow leaves. Some tephritids cause galls on the roots, stems or flower heads of their host plants.

Some European thistles and knapweeds have become established in North America, where they are serious weeds of pasture land. There is considerable interest in the use of tephritid flies which cause galls in the flower heads, since the formation of the gall greatly reduces the number of seeds that develop. Before flies can be introduced it is essential to research them thoroughly to make sure they will develop on the weed without harming other plants. Detailed taxonomic studies of the flies can help to establish the likely host plant range. Some tephritid species complexes have been discovered and split up into their component species. This enables species associated with the weed plant to be identified as possible candidates for biological control. Wing patterns, although distinctive, are not necessarily good taxonomic features. The genitalia, particularly of the females, can be more reliable. Mr White gave an example of how attempts to introduce a fly into the USA against yellow star thistle in 1976 and 77 failed. It was not until 1984 that genitalia studies showed that there were two species with similar wing markings and that the wrong one was being introduced.

Some species of tephritids are major pests of trees and vegetable fruits. The males are often attracted to substances such as ammonia, methyl eugenol or cue lure. These can be used for monitoring purposes or, by adding insecticide, as a means of control. Fruit feeding species of tephritid can be spread by the international trade in fruit. Quarantine areas and checks on imported fruits are made with varying degrees of success to try and prevent their spread. Unfortunately, there is currently no way of identifying these flies to species level at the larval stage, which is how they are most frequently found in imported fruits. Accurate host plant records based on bred specimens are needed for all species. Even Britain's well studied tephritids have three species for which the host plants are unknown.

25 April 1990

The president Mr C. W. PLANT announced the death of R. M. E. Pilcher on 13 December 1989 at the age of 86. Mr Pilcher joined the society in 1973. An obituary was published in *Ent. Rec. J. Var.* 1990; **102**: 93–95.

Exhibits

Mr R. A. Jones showed three specimens of the large stonefly *Diura bicaudata* (Linnaeus), from under stones at the side of Loch Awe, Argyll, on 5.iv.90. The males of this species have greatly shortened wings.

Prof. J. A. Owen showed a pair of the weevil *Ceutorhynchus cakilis* Hansen taken at a coastal site near Grenitote, North Uist, Outer Hebrides in July 1979 with a pair of *C. floralis* (Paykul) from Surrey for comparison; *C. cakilis* was long considered by many to be a variety or subspecies of *C. floralis*. However, the acknowledged weevil expert, the late Herr Dieckmann concluded that they were separate species. This would appear to be the first British record for this species. *C. cakilis* is larger (2.2–2.6 mm) than *C. floralis* (1.5–2.1 mm) with, on average, three rows of hairs on each elytral interval compared with an average of two rows in *C. floralis*. *C. cakilis* is a littoral species, breeding on sea rocket (*Cakile maritima* Scopoli) and less often on sea kale (*Crambe maritima* Linnaeus). For further information see Dieckmann, L. 1972. *Beitr. Ent.* **22**: 3–128.

The president Mr C. W. Plant showed examples of the hoverflies *Platycheirus europeus* from Tilty, North Essex, on 7.v.88, and *P. occultus* collected in Ireland by Mr M. Speight. These two species, in the *Platycheirus clypeatus/angustatus* complex, were recently described as new to science by Goeldlin de Tiefenau, Maibac and Speight (*Dipterist's Digest* 1990; **5**: 19–43) along with a third species *P. ramsarensis*. In the same journal (pp. 5–18), Speight and Goeldlin de Tiefenau provide a key to the group. *P. europeus* has, until now, only been recorded in the UK from Scotland.

Membership

The names of Mr I. Bolt and Mr J. Gale were read for the second time, and these persons were duly elected as members.

Communications

The President announced that he had on that day heard a cuckoo. Mr R. Dyke reported that he had heard one 2 days earlier.

The Secretary Dr J. Muggleton read a letter from Mr A. H. Kirk-Spriggs of the National Museum of Wales who is currently working on a Royal Ent. Soc. Handbook on the flower beetles, the Nitidulidae, and who would be glad to examine members collections for these beetles, and identify small series if required.

Mr E. Bradford reported that cranes had apparently been recorded off the East Coast recently. Prof. Owen commented that he had read a notice in *The Times* by the President of the RSPB asking people NOT to try and find the cranes.

Mr Bradford also reported seeing several speckled wood butterflies recently, including a number of remarkable small specimens. Mr E. W. Groves suggested that these small specimens might be the result of a partial second brood at the end of 1989.

Lecture

Dr M. E. G. Evans spoke on the subject of 'Running, jumping and burrowing beetles'. He distinguished between two forms of locomotion—ordinary such as walking, running and climbing, and escape including flying and jumping. By comparing leg size, and pulling/pushing forces it is possible to construct a continuum, from very fast but relatively weak species like tiger beetles to slow strong pushers like dung beetles. At one extreme, tiger beetles run on stilt-like legs at 600 mm/s and at the other large tropical scarabs exert tremendous force with broad spade-shaped

tibiae. Carabids are specialists in 'wedge-pushing', pushing through the herbage layer. They have enlarged trochanters, heavily muscled, enabling them to push both down and backwards thus moving their bodies upwards and forwards. This 'wiggling' enables them to press forward through soil and litter.

General foliage walkers fall outside of the speed/force continuum, because they have not needed to 'specialize' in either speed or strength. Instead, many have developed large pads on their tarsi to hang on to the plant substrate, and in the case of the males, to hang on to the females during mating. These pads comprise large flattened hairs, which adhere to surfaces. The strength of the adhesion is increased by the secretion of lipid or oily fluids.

Jumping in flea beetles and click beetles has evolved as an escape mechanism. Huge muscles stretch tendons, much like a catapult. When the tension is released the insect is propelled upwards with tremendous force. By studying high-speed cinematographic films of click beetles clicking it becomes apparent just how they jump. By tensing a peg on the prothorax against a protuberance on the mesosternum, the 'jumping muscle' can build up tremendous tension. When the peg 'slips the catch', it slides almost frictionless into a pit in the mesosternum. The beetle jack-knifes, hingeing on a joint between the thorax and abdomen. This action moves the beetle's centre of gravity upwards, carrying the beetle with it. Jumping occurs at a speed of about 1–2 m/s. Larger animals can achieve this speed moderately slowly because they have long legs with which to build up speed. But insects also need to achieve this same speed with relatively extremely short movements. In click beetles, the jack-knifing movement occurs extremely rapidly, in 0.64 ms, (0.00064 s). In a 6-mm beetle, the centre of gravity moves by about 0.75 mm, and at this speed, it exerts a force of 400 ***g***. (Fighter pilots black out at 10 ***g***, and a bad head-on car crash will exert about 50 ***g***.)

After the lecture, there was a lively discussion, and Dr Evans answered a number of questions from the floor.

9 May 1990

EXHIBITS

Mr I. FERGUSON exhibited a live specimen of the local beetle *Pyrochroa coccinea* (L.) (Coleoptera: Pyrochroidae). It is associated with dead wood and was found within 5 minutes walk of the Chancellor of the Exchequer's country retreat at Chevening, Kent, on 7.v.90.

Mr E. BRADFORD also showed a live specimen of *P. serraticornis* (L.), together with several live specimens of the longhorn beetle *Mesosa nebulosa* (F.). Both species emerged from dead wood, the latter from oak, on 8.v.90. The pieces of wood were found on the ground in Childs Forstal Wood, East Blean, Kent.

Mr Bradford also showed some live specimens of *Hedobia imperialis* (L.) (Coleoptera: Anobiidae), which emerged 9.v.90 from dead rose stems underneath a hedge at Pean Hill, Whitstable, Kent.

Mr A. J. HALSTEAD showed a shoot of holly, *Ilex aquifolium* L., taken from a garden at Knaphill, Woking, Surrey. It was a variety with yellow berries which had proved unattractive to birds, resulting in the bush being covered in berries and flowers at the same time. Mines of the agromyzid fly, *Phytomyza ilicis* Curt. were present. Mr Halstead also showed a live caterpillar of the lesser yellow underwing moth, *Noctua comes* (Hübn.) found at the RHS Garden, Wisley, Surrey. It had a compact cluster of larvae of an unidentified hymenopterous parasite attached to the left side of its thorax on the meso- and meta-thorax segments.

The President, Mr C. W. PLANT, showed some cigar galls on common reed, *Phragmites communis* L., caused by *Lipara lucens* Meig. (Diptera: Chloropidae). One gall had been opened to show the larval chamber, and a second opened gall contained the empty pupa where an adult fly had emerged through the top of the gall. Two pinned specimens of both sexes of the fly were also shown. The galls were collected at Rainham Marshes, south Essex on 23.ii.90.

Mrs F. M. MURPHY displayed some colour prints of Dinton Pastures Country Park, Berkshire.

LECTURE

Dr J. P. EDWARDS spoke on caste determination in ants with particular reference to the pharaoh's ant, *Monomorium pharaonis* L. This is an introduced species in Britain which is a widespread nuisance in heated buildings. A typical colony consists of several fertile queens with numerous infertile females or workers. At certain times males are also present. The latter are haploid and develop from unfertilized eggs, while the queens and workers are diploid and come from fertilized eggs. Dr Edwards said there were three possible mechanisms which might determine whether a fertilized egg gives rise to a queen or worker ant. These are: (1) genetic, which means that once laid, the fate of the egg is already determined; (2) blastogenic changes which occur at the embryo stage, and (3) trophogenic changes brought about by differing treatments of the larval stage.

Dr Edwards described the investigations he had carried out to find out what factors initiate the production of sexual forms. The presence of active egg-laying queens inhibits the production of new queens and males. A semio-chemical present in egg-laying queens but not in virgins was extracted and identified. However, when this chemical was given to queenless colonies or applied to virgin queens it failed to inhibit the rearing of sexual forms. This chemical would appear to be a queen recognition substance and not a caste determinant.

Dr Edwards believes that it is the presence of plenty of eggs that inhibits the development of sexual forms. Juvenile and senile queens have lower egg laying rates than queens in the middle period of their adult life. If male or queen larvae are added to colonies with active queens, these larvae are likely to be eaten by the worker ants. Larvae destined to be workers have small hooked hairs on their bodies, whereas the larvae of the sexual forms are smooth. It seems to be this difference, rather than size or chemical scents, that allow the worker ants to recognize the larval castes. Experiments with colonies from which queens had been removed suggest that larvae of the sexual castes are normally present at all times but are destroyed, if not needed, when about 2–3 days old. This suggests that caste determination in this species of ant could be genetical with the queen laying three types of egg that develop into male, queen or worker larvae.

23 May 1990

EXHIBITS

The President, Mr C. W. PLANT, exhibited five adults of the supposedly rare hoverfly *Brachyopa insensilis* Collin which he had taken at sap runs on horse chestnut trunks in Weald Park (two males and one female) and Thorndon Park (one male) on 19.v.90, and in the town centre of Bishop's Stortford (one male) on 20.v.90. The first two localities are in South Essex, and the latter is in Hertfordshire. The stated rarity of this fly appears to have been derived from the frequency with which the adults are

caught by traditional methods such as sweep netting. Searching for the larvae in sap runs on horse chestnut trees in May is far more productive, and invariably produces a positive result. In many instances the probing of the sap run by the searcher seems to attract adult flies; presumably the 'stirring-up' of the sap run increases odour production. The five flies exhibited were taken at five sap runs, and each within a few seconds of starting to probe the runs.

Mr P. J. CHANDLER confirmed that sap runs on horse chestnut trees were the place to find *Brachyopa insensilis*, and this had certainly been true for the last 5 years. Mr C. W. Plant commented that the species used to be associated with the sap runs on elm trees.

ANNOUNCEMENTS

The President reported that he had written, on behalf of the Society, to the Minister and various public bodies concerned with the museum service, to express the Society's dismay at the proposed re-organization of the British Museum (Natural History) and the staff redundancies there which included staff in the Entomology Department.

LECTURE

Dr Malcolm Luxton gave a fascinating lecture on the relationships between mites and men which was illustrated by scanning electron microscope pictures. He started by explaining that mites belonged to the subclass Acari of the class Arachnida. He said that the name Acari was derived from that used by Aristotle for mites, and which meant 'little drops of wax'. Mites showed three types of association with Man which could be described broadly as nuisance, irritant and intimate.

Nuisance mites were often those attracted to fungus growing on organic material in buildings, and where they can cause infestation. *Glycyphagus domesticus* (Deg.) and *G. destructor* (Schr.) were examples of species causing infestations in these situations. Other species such as *Acarus siro* L. on flour and grain, *A. chaetoxysilos* Griffiths on cheese and *Carpoglyphus lactis* (L.) on dried fruit, frequently became pests of stored food products. In one instance, however, this had been turned to advantage, and one German cheese is deliberately infested with the mite *Tyrolichus casei* Oudemans in order to give the cheese an added piquancy. A rather different example of nuisance mites are mites of the genus *Bryobia*. These are red spider mites which spend most of their life in lawns and flowerbeds; however, at the breeding time, large numbers of these mites leave the garden and swarm onto the walls of houses and from there often enter the houses. They are quite harmless to man but generate a large number of enquiries every year from members of the public, who seek advice on how to deal with these pests.

Among the irritant mites is *Dermanyssus gallinae* (Deg.); this species can infest houses and can be very troublesome to humans, causing red wheals and punctures on the skin, but as with other mite species not all people are allergic. Species of *Pyemotes*, which are parasites of beetles, will bite humans when they come into contact with them. This seems to occur most frequently when people are working with grain or in chicken houses. The bites cause an irritation on the skin and produce an irritating dermatitis, known as 'grocer's itch' in particularly allergic people. Another mite causing intense irritation is *Sarcoptes scabei* Deg. which is responsible for the skin disease scabies. The mites live in burrows in the skin, which may be up to 2 cm long. They are transmitted from infested bedding or by prolonged body contact.

The intimate group of mites include harmless species such as those from the genus *Demodex*, which are found in association with hair follicles, usually on the face. A survey conducted in the USA showed that 75% of the human population has these mites, which feed on the sebum produced by the hair follicles. However, the intimate group of mites also includes disease transmitting species such as the ticks. Ticks are the biggest mites and are vectors of many tropical diseases, including diseases caused by viruses, bacteria and protozoans. Ticks themselves can inject neurotoxins into the host's bloodstream causing 'tick paralysis'. The effects of this paralysis disappear once the ticks are removed. Finally among the 'intimates' there are the house dust mites (*Dermatophagoides* spp. and others) which feed on sloughed skin scales and which are most frequently found in bedding and household dust. These may produce asthma in those allergic to them. They can be controlled by regular and thorough hoovering, especially of mattresses.

OFFICERS' REPORTS FOR 1989

Council's report

There were eight Council meetings during 1989 and, on average, 14 members attended each meeting.

The Society's membership showed a net increase in 1989, standing at 736 at the end of the year. 51 new members were elected during the year and one was re-instated to membership; against this, eight members were struck-off for non-payment of subscriptions and eight members resigned. Five deaths were reported during the year. At the end of the year Major D. B. Baker completed 50 years continuous membership of the Society and was elected a special life member.

The death during the year of Mr S. N. A. Jacobs left a vacancy among the Society's honorary members. In respect of his services to the Society, and to the study of the Microlepidoptera, the Council was pleased to elect Colonel D. H. Sterling to honorary membership.

The Society bade farewell to the Alpine Club Rooms following the indoor meeting on 14 December 1989, and earlier that week the library and collections were removed into storage with Messrs Pickfords. As anticipated in last year's report much of the council's time this year has been spent trying to find new accommodation for the Society following our departure from the Alpine Club Rooms. A wide range of possibilities has been discussed, including looking for new premises outside London. Having considered the pros and cons the Council felt that, on the whole, we should attempt initially to find suitable accommodation in Central London. To date extensive enquiries, involving many hours work by council members, have failed to find suitable accommodation in Central London at a price the Society can afford. In the present economic climate, bodies who may have looked on us benevolently in the past are now requiring a full commercial rent, and for the space we require this is likely to be around £16–18,000 a year. It is becoming increasingly likely, therefore, that the Society will have to seek a location outside London for its collections and library, while retaining some evening lecture meetings in Central London. Such a move is likely to change the nature of the Society and a decision to move the collections and library outside London will only be made after careful consideration of the effects.

In the meantime the Society's indoor meetings will be held in the rooms of the Royal Entomological Society in South Kensington, and we are grateful to Royal Entomological Society for their help with this arrangement. We are also grateful to

the London Natural History Society for their generous offer to make their library, housed in Imperial College, available to our members on the same terms as those enjoyed by the LNHS's own members. Our Trustee, Mr C. B. Ashby, was instrumental in arranging this.

In other ways the Society's activities have continued as normal. Michael Simmons arranged a programme of 21 indoor meetings which included lectures on the Lepidoptera, Coleoptera, Hymenoptera, Orthoptera, Diptera and Odonata, as well as more general natural history subjects. Attendance at the meetings has, however, been disappointingly low, with an average of 16 members signing the attendance book at each meeting. Roger Key drew up his first programme of field meetings, and included many new venues among the 21 meetings. These meetings also suffered from poor attendance and this prompted the field meetings secretary to circulate a questionaire at the annual exhibition asking members what they wanted from the field meetings programme. The responses will be used to plan future programmes.

Once again Dr Basil MacNulty ably organized the annual dinner which followed the annual exhibition at Imperial College. For the second year running the numbers attending the dinner increased, and it was judged a great success by all present. The numbers attending the annual exhibition also increased, with 198 members and 83 visitors signing the attendance book. The exhibits were of a high standard and the provision of tables and extra seating made the business of relaxation between viewing the exhibits a great deal easier! Andrew Halstead is to be congratulated on another successful exhibition.

As well as a new field meetings secretary, a number of other new faces have appeared among the assistant secretaries. Andrew Godfrey has taken over the important work of membership secretary, and therefore becomes responsible for ensuring a steady flow of 'new blood' to the Society's ranks. The number of new members recruited this year is a mark of his success. David Young has become distribution secretary and will be ensuring that the Society's mail continues to flow smoothly.

After five years as sales secretary, Andy Callow resigned at the end of the year. The Society is very grateful to him for all the effort he has put into selling the Society's publications, which included handling the sales of the very successful hoverfly book. These sales are a major source of funds for the Society.

There were no new publications produced during 1989, but a new membership list, replacing that produced in 1985, was circulated to members.

Treasurer's report

During 1989 the running of the Society, excluding those quite considerable extra costs due to the move from the Alpine club, came to £7950. This does not include the cost of coloured plates in the Journal which was met by a grant from the Hammond and Crow Memorial Fund. Subscriptions and donations brought in £5852, so there was a shortfall of £2098 on normal expenditure. In other words subscriptions would have needed to be 36% higher for them to have covered normal running costs. However we have in hand capital set aside to deal with accommodation problems and also earlier investments and income from these amply covered the shortfall.

During the year, we have had some welcome additions to our capital. We received a legacy of £100 000 from the late Duke of Newcastle and a second instalment of £27 500 from the late Mr Crow (which was followed just after the end of the year by a final instalment of £6493). If it had not been for these generous legacies, plus the earlier legacy of the late Mr Hammond, it is difficult to see how the society could have had any hope of continuing in its present form following the loss of our rooms at the Alpine Club.

Even with these legacies and our other accumulated funds, London accommodation costs have risen so sharply that suitable London accommodation within our means either for purchase or rent has not so far been found, so it is difficult to set a realistic subscription for 1991 until we know what one of the major cost items, accommodation, will be. Hopefully by September, the latest date at which the 1991 subscription rate must be determined, the picture will be clearer. If not, we shall have to consider whether to make a subscription increase based on adjusted 1989 costs, as the last subscription increases were on 1 January 1987, and, as I said earlier, the rate is now unrealistically low, and we are relying on income from funds that may at any time be used up to provide accommodation.

Balance sheet as at 31st December 1989

1988 £				1989 £	
24574		*General fund*	—Opening balance	26744	
2170	26744	Excess of income over expenditure		3035	29779
	2308	*Housing fund*	—Balance		2308
18685		*Special*	—Opening balance	22066	
3381	22066	*publications*	Surplus from sales	1793	23859
31229		*Hammond, Crow*	—Opening balance	48535	
3671		*& Pelham-*	Income	10582	
15000		*Clinton*	Crow bequest	27500	
		Bequest funds	Pelham – Clinton bequest	100000	
49900				186617	
1365	48535		Expenditure	1031	185586
3494		*Hering*	—Opening balance	3494	
		memorial	Donation	1000	
417		*fund*	Income	525	
3911				5019	
417	3494		Expenditure	723	4296
	103147		*Total funds*		245828
			These funds are represented by:–		
		Investments at cost (details appended)			
39658		General and bequest investments		39658	
3340	42998	Hering Memorial Fund investments		3340	42998
		Stock			
8499		Special publications at cost		7262	
309	8808	Christmas cards		241	7503
		(The value of the library, collections, ties, back numbers of proceedings and journals and the computer system is not included in the accounts)			
		Liquid assets			
41559		N.S. investment account		46078	
1536		Debtors and advance payments		1367	
		Cash on Sterling money market account		135000	
7682		Cash on business reserve account		8763	
3528		Cash on current account		5675	
54305				196883	
2964	51341	Less subscriptions in advance, amounts owed and provisions		1556	195327
	103147				245828

Income and expenditure account for 1989

1988 £		1989 £	1988 £		1989 £
3744	Publications account	4062	5556	Subscriptions	5700
1793	Rent and insurance	1806	4020	Interest and dividends	6229
512	Stationery and general expenses	1224	66	Donations	152
			84	Surplus on christmas cards	16
673	Indoor meetings and exhibition	729		Surplus on cabinets and collections	412
330	Cabinets and collections			Surplus on library	184
444	Library		26	Surplus on dinners 1988 & 1989	69
86	Subs/donations other societys	129			
	Move from Alpine Club	1777			
2170	Excess income over expenditure	3035			
9752					
		12762	9752		12762

Publications account for 1989
(Publications free to members)

3694	Production of journal	4701	846	Sales	808
896	Distribution costs	930		Bequest funds grant for plates	761
			3744	Net cost to income & expenditure	4062
4590		5631	4590		
					5631

Special publications account for 1989
(Publications for sale)

3970	Opening stock	8499	6044	Sales	3053
6756	Field guide 2nd edition			Excess 1988 provision	400
436	Distribution & general costs	423	8499	Closing stock	7262
3381	Surplus to spl. publications fund	1793			
14543					
		10715	14543		10715

Schedule of investments as at 31st Dec. 1989

		Book value at cost		Assessed current market value	
		General & bequests £	Hering Memorial £		£
1230	Shell T&T 25p Ord.	477.79	771.83	@ 498	6125
750	Unilever 5p Ord.	248.45		@ 729	5468
6214	M.&G. Charifund Units	19091.17	817.24	@ 601.9	37402
£2258.84	Treas. 9½% 1999	771.22	1451.21	@ $95^{5}/_{16}$	2153
£3863.71	Treas. 8¾% 1997	3687.94		@ $91^{1}/_{16}$	3518
£3882.90	Treas. 9% 1994	3759.57		@ 92⅜	3596
£4098.06	Treas. 13¾ 1993	4041.44		@ 107⅜	4400
£2138.90	Funding 5¾ 1991	1670.00		@ 93	1989
£6836.92	Treas. 8¼ 1990	5910.00	300.00	@ 97⅝	6675
		39657.58	3340.28		71326

For 1990 the cost of storing our property and hiring rooms as needed for ordinary and council meetings will cost us about £1800 a year more than we paid in rent to the Alpine Club in 1989, that is well over double, so if this situation is likely to continue in 1991, it is another factor to be taken into account.

Our thanks to Geoff Burton who continues to perform wonders on our computerized membership and subscription records, and also to the Society's honorary auditors, Tony Pickles and Reg Bell.

D. H. STERLING

Auditors' report

In our opinion the annexed balance sheet gives a true and fair view of the Society's affairs as at 31st December 1989 and the income and expenditure accounts give a true and fair view of the Society's results for the year.

A. J. Pickles F.C.A.
R. A. Bell

PROFESSOR HERING MEMORIAL RESEARCH FUND

Two grants were made for 1990, and the Committee agreed to allow a 6-month loan of the microscope and accessories bequeathed to the Fund by the late Edward Pelham-Clinton, 10th Duke of Newcastle.

Mr Kenneth Bond, University College Cork, has been given the sum of £500 for his study of the morphology of larvae belonging to the leaf-mining lepidopteran genus *Phyllonorycter*. In particular, Mr Bond needs to undertake additional fieldwork, in various parts of the British Isles, to collect larvae.

Dr Brian Pitkin, The Natural History Museum, London, has been granted the sum of £222.50 to support his work in producing an illustrated field guide to the leaf- and stem-mines of British Diptera. The money has been requested to enable some additional field trips to be made, and to purchase film to make further photographs of mines.

Mr Andrew Liston, Forestry Commission, Dolgellan, Gwnedd, has been given permission to borrow the Wild microscope and its accessories left to the Fund by the late Duke of Newcastle. Mr Liston is revising the Symphyta parts of the *Handbooks for the Identification of British Insects*, and requires the use of a microscope to examine sawflies and to make illustrations.

A very acceptable, anonymous donation of £1000 was made to the Fund last year. Members of the Committee are extremely grateful to the generous donor concerned. The sum has enabled amounts larger than usual to be granted to applicants, with the obvious benefits that that implies.

Last year, the Committee agreed to make an award to Dr Kenneth Spencer to help defray typing costs of his manuscript on the hostplants of Agromyzidae of the world. Dr Spencer has let me know that the manuscript has been completed, and that it is in press. It is pleasing to know that the Fund has been able to help this major project.

Finally, I am sure that the Committee would wish me to thank the editors of the various journals who advertise the details of the Fund.

M. J. SCOBLE

LIBRARIAN'S REPORT

The announcement that the Society would have to leave its premises in 1989 was received with great anxiety in the library. Inevitably it was likely that the books would be very vulnerable during this period of instability. Firstly attempts were made to discover exactly how much space our books currently occupied. Secondly we

needed to estimate how much shelf-space we would require based on our existing holdings plus an allowance for growth in case any properties became available.

Having considerable concern for the future of the library I also became involved in the search for new premises and latterly for suitable storage premises. I also made informal approaches by phone to the British Library and separately through Mr W. G. Tremewan to the Natural History Museum library regarding the possibility of safely storing at least the Society's collections of rare books. Unfortunately both organizations reported that this would not be possible.

In mid-July following council's approval I reluctantly decided to make provisional approaches to commercial removal companies. Two estimates for removal with storage as an option were subsequently received. The lowest quote for removal, packing and storage for one year was received from Pickfords Removals Limited, this amounted to just over £3300. Efforts were still being made to try to find somewhere else to store our effects. Approaches were made in October to the Hope Department of Entomology and with council's permission I also placed an advert in the journal of the Library Association. Unfortunately both these approaches failed.

In October both the Curator and myself inspected the Pickfords storage premises in Fulham. Judging them to be suitable, the company's estimate for removal was accepted and this took place on the 11th and 12th of December; the collections going to their Fulham store and the books going into a container store at Hayes.

It was with great distress that I learned from the President on the 21st of December that she had just been informed by a London bookseller that he had been offered nine books with the Society's bookplate in. Sadly it has not yet been possible to determine when and how the books were stolen. The theft was reported to the police however they have not been successful in their investigations of the case so far.

At this point it might be worth consideration of what future direction the library could take. Should the Society sell all its more valuable books? Historically the Society has not insured them to their full value; would we be better off without the worry of them? The library could then be smaller and more manageable, especially if entomology only was concentrated on. The main British journals could be retained with perhaps a handful of European ones.

If the Society does not choose the above route then not only will we need a lot more space in the future as taxonomic publishing expands, but we will also need to look at the security problem seriously. Certainly a better library loan system is needed. I believe some sort of automated loan system linked to an inventory will be required if we are to keep a better eye on our books. Or perhaps all the books should be kept locked up unless an officer of the Society is able to assist a borrower, a retrograde step I agree but perhaps necessary.

I would like to thank all those members who offered storage space for the Society's books and who offered to help with the Society's removal. I would also like to thank the President Frances Murphy and the Curator Peter Chandler for their help with the actual removal. Thanks are also due to Joan Heath, Michael Majerus and the Nature Conservancy Council who have presented books to the library during the past year. Finally thanks are also due to Colin Plant, Brad Ashby and John Matthias for alerting some other related organizations to the theft of the society's books in the hope that we might limit any possible future losses.

S. R. Miles

Curator's report

The emphasis on cataloguing the Society's collections which was developed in the previous year continued into the early part of 1989. Last year it was reported that the

Lepidoptera collections had been catalogued and that lists of Lepidoptera either unrepresented or represented by less than four specimens had been compiled. These were initially provided at his request to Col. D. H. Sterling, who was able to contribute specimens of 11 species new to the collection and five species from the poorly represented list. The identification of some species of Microlepidoptera in the existing collection has also been corrected by Col. Sterling and I am grateful to him for the interest he has shown in improving the collection. Publication of the list of species still required by the Society will now have to await the move to new premises.

This year began with the completion of the cataloguing of the Coleoptera which started in 1988. As I stated last year, the Joy collection of Coleoptera contains 3176 species and will remain a separate entity. It is still planned to amalgamate the main Coleoptera collection, principally based on the Henderson collection with the presently separate Massee collection. It can now be stated that these other collections, when combined, will contain 3064 species and together with the Joy collection 3416 species are represented in our Coleoptera collections. From reference to the updated check list by Prof. J. Owen, mentioned last year, it was ascertained that 535 species of beetle are absent from the Society's collections. Lists of these and of the 352 species only in the Joy collection were compiled. Additions from both lists will be sought from donations by members and John Owen has kindly indicated that he will be able to provide a good number of these species. The reduced lists will then be circulated among other coleopterists but further work on the Coleoptera will have to be left in abeyance at present.

During 1989 the Hymenoptera collection was transferred to the 40-drawer cabinet previously made ready so that space is now available for all British species of sawflies and aculeates; both groups have been arranged according to the latest check lists. Only six drawers were, however, set aside for Parasitica as it is not expected that they will be expanded.

Interest in obtaining data for the Bees, Wasps and Ants Recording Scheme was expressed by Mike Edwards, and he has agreed to check identifications of the bees and to identify any unnamed material. These will be transferred to him so that work may proceed this year. The bulk of the wasps were checked by John Felton some 20 years ago and will be retained by the Curator at present until Mr Edwards has dealt with the bees.

David Moore has finished his arrangement of the British butterflies in two Hill units and he has volunteered to begin tackling the necessary rearrangement of the larger British moths, although this will have to await establishment in a new location. I also wish to thank David for other support given during the year.

In addition to the donations by Col. Sterling already mentioned, I am grateful to Mr C. B. Ashby for incorporating some further additions to the collection of Scandinavian Lepidoptera on behalf of their collector Stig Torstenius. With the continuing expansion of this collection, it is hoped in the future to make a further Hill unit available to permit a more satisfactory layout than the present 30 drawers allow.

The year has closed with the transference of the bulk of the collections (some 39 Hill units and 20 other cabinets) to a Pickfords' warehouse at Fulham, where they have been arranged so as to permit access during occasional visits by the Curator, to be carried out during the period of storage. The only exceptions to this are the 20 drawers of Aculeate Hymenoptera for which the previously mentioned arrangement has been made and the three Hill units of the Torstenius Collection which are being housed by Mr Ashby to enable him to continue its curation. From an initial visit to Fulham it can be said that the collections have survived the journey there quite well and it is expected that their storage there will be adequate at least in the short term.

I would like to express my gratitude to all those already mentioned and not least to Bill Parker for valuable assistance throughout the year.

P. J. CHANDLER

Editor's report

Nothing happened to the Journal in 1989. Nothing untoward that is, nothing unexpected, nothing worrying, nothing problematical. This is just as well, since the successful appearance of any journal depends on the routine playing out of the publishing schedule. So, with nothing happening, the journal has had another good year, but it does mean there is nothing to write very much about for an editor's report, hence this rather short note.

In 1989 the Society's Journal again published four issues, totalling 192 pages. Four colour plates from the 1987 and 1988 Annual Exhibitions were also published—the cost being met from the Hammond and Crow Memorial Fund. The index for 1987 was published with the first issue of the year.

The Journal continued to enjoy a regular supply of interesting notes and articles, ranging from aphids to slug killer, mating behaviour to parasitism. These, together with reports of indoor and field meetings have, I hope, made the Journal a lively forum for entomological debate.

With the slightly uncertain future of the Society hanging over us, it is a great comfort that so many contributions keep appearing both from members and non-members—obvious signs of continued support.

R. A. Jones

SHORT COMMUNICATION

***Hadrognathus longipalpis* (Mulsant & Rey) (Coleoptera: Staphylinidae) in South Wales**—*Hadrognathus longipalpis* was first recorded in Britain in 1987, when Lott (1989) found three specimens in a quarry in Cumbria. Further searches in the same site have also succeeded in finding *H. longipalpis* (John Owen, pers. comm.).

Whilst sorting material collected in fieldwork in 1989 for the Welsh Peatland Invertebrate Survey (a Nature Conservancy Council survey), *H. longipalpis* was found from a number of sites. In total this species was found in 10 trapping stations in eight sites: three in West Glamorgan, three in Carmarthenshire and two in Brecknock. Although all the sites were peatlands, they covered a range of habitats of diverse hydrological and nutrient status. Dates of capture ranged from 28 June to 4 October, where the dates represent the last date of a 14-day trapping period. Individual *H. longipalpis* were found in pitfall traps, water traps and litter searches.

It is of interest that this species was only found in 1989. Peatlands in southern counties of Wales had been studied in previous years, including Pembrokeshire in 1987 and Gwent in 1988. Lott (1989) suggests that since it was discovered in a quarry, *H. longipalpis* may have been accidentally introduced. This would seem unlikely since several of the sites where we found it were well inland, and far removed from any likely source of introduced material. It may well be that the wide occurrence of this species in 1989 was related to the very warm, dry weather, or alternatively the species is beginning a phase of rapid colonization of Britain.

We thank Professor John Owen for identifying our first specimen of *H. longipalpis*.—P. R. Holmes, D. C. Boyce & D. K. Reed, Nature Conservancy Council, Plas Gogerddan, Penrhyncoch, Aberystwyth, Dyfed SY23 3EE.

Reference

Lott, D. A. 1989. *Hadrognathus longipalpis* (Mulsant & Rey) (Coleoptera: Staphylinidae) new to the British Isles. *Entomologist's Gaz.* **40**: 221–222.

ANNOUNCEMENT

Friends of The Natural History Museum, London.—There can be few people concerned with the environment who have not at some stage had cause to refer to the Natural History Museum, London. Many will have consulted the incomparable collections as well as the public galleries.

The museum's corporate plan 1990–1995, announced earlier this year, has been greeted with almost universal dismay by the scientific community worldwide. Over 900 letters of protest have already been received.

A number of us, who are not members of the museum staff, but who have been closely associated with the museum for many years, feel that the measures proposed are likely to provide only a short-term, and unsatisfactory solution to certain fundamental problems underlying the museum's corporate structure, finance and management.

In particular we feel that there has been inadequate consultation with members of the public, both at home and overseas, who regularly use the museum's magnificent collections. Moreover there is currently no avenue through which these views can be expressed, either to the Board of Trustees, or to the Government, other than by public outcry of the type we have been involved in over the last 6 months.

We also note that NHM, unlike the majority of museums of similar standing, has no "friends' organisation", to publicize generally in intelligent, but not necessarily purely scientific terms, the worldwide importance of the research work undertaken behind the scenes.

For this reason, we are looking into the possibility of setting up a friends' organisation. We are not at this stage asking you to subscribe: we would merely like you to express in principal your support for such a move. We will keep you informed of the result of the meeting, and, if it is decided to set up a Friends of NHM organisation, you will be invited to become a founder member. (We have in mind an annual subscription of £15).

We plan to hold a public meeting in London on 25 October 1990 at 6.00 p.m. to decide on the form such an organization should take. In order to save mailing and secretarial costs, the venue will be announced in the Personal Column of *The Times*. Alternatively you may ring Mrs F. M. Murphy on 081 979 2005, who has kindly agreed to act as our liaison officer, and provide such information as is available prior to the meeting.

It seems likely that we shall in due course need an Honorary Secretary and Honorary Treasurer, preferably based in London and the former with a word processor to maintain a membership list. If you would be prepared to volunteer for either of these posts, please contact Mrs Murphy in advance at the above phone no.

We look forward to your support: please give maximum publicity to this notice, and encourage your friends and colleagues to contact us.—Jonathon Porritt, Henry Barlow.

INSTRUCTIONS TO AUTHORS

Contributions must be double-spaced with 3cm margins either side to facilitate marking up. They should be typed if possible, on one side only of A4 paper. Layout should follow that of the journal, but apart from underlining scientific names, no marks should be made to define typeface.

Line and continuous tone figures are accepted. Writing on figures is best listed separately for setting and its placing indicated on a duplicate figure. Seek advice before drawing. Reduction may otherwise necessitate redrawing.

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